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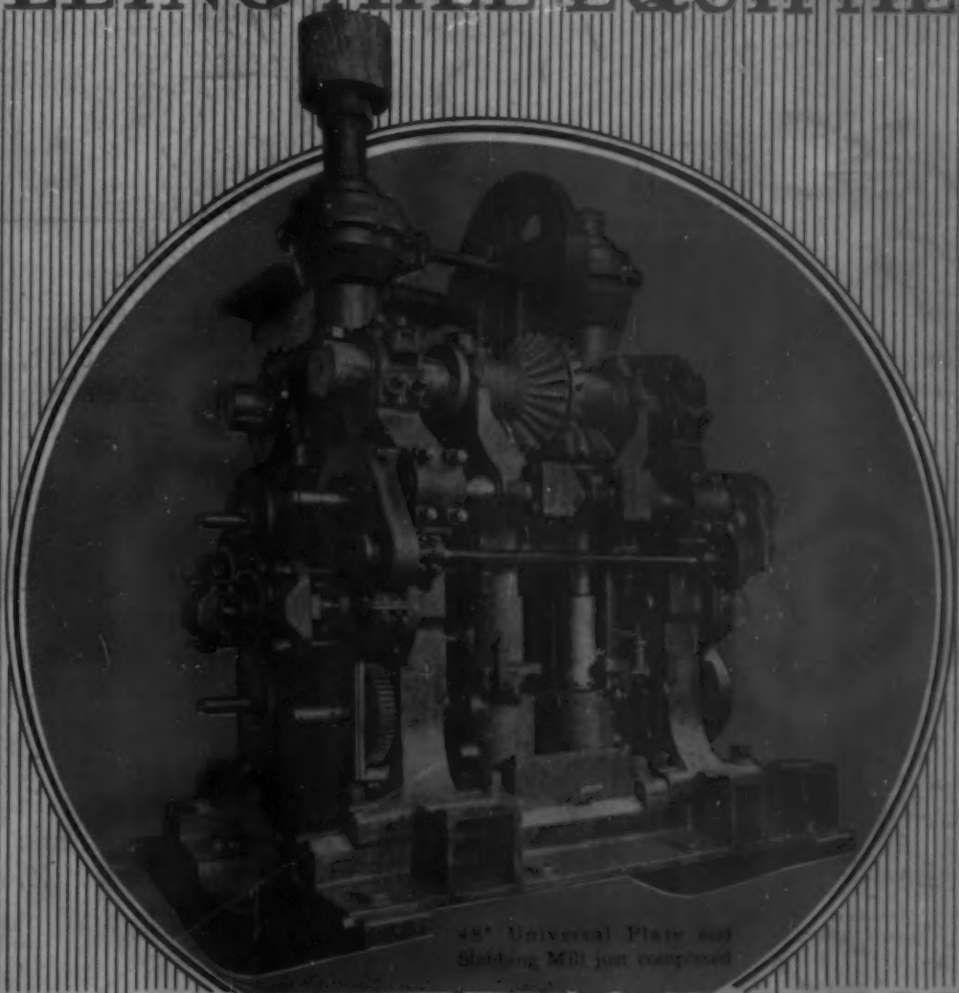

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Courage To Win In 1922

By C. J. Stark

GOOD cheer has not been prominent in the business situation of 1921. In reality, it has been a missing quantity. A dull, dead-spirited attitude has characterized all commercial affairs. Hesitation and downright pessimism have been in the ascendancy. The material factors upon which this state of mind has fed have been numerous and impressive. Actually what has filled 1921 has been the manifestations of a fundamental law. This law is that of action and reaction.

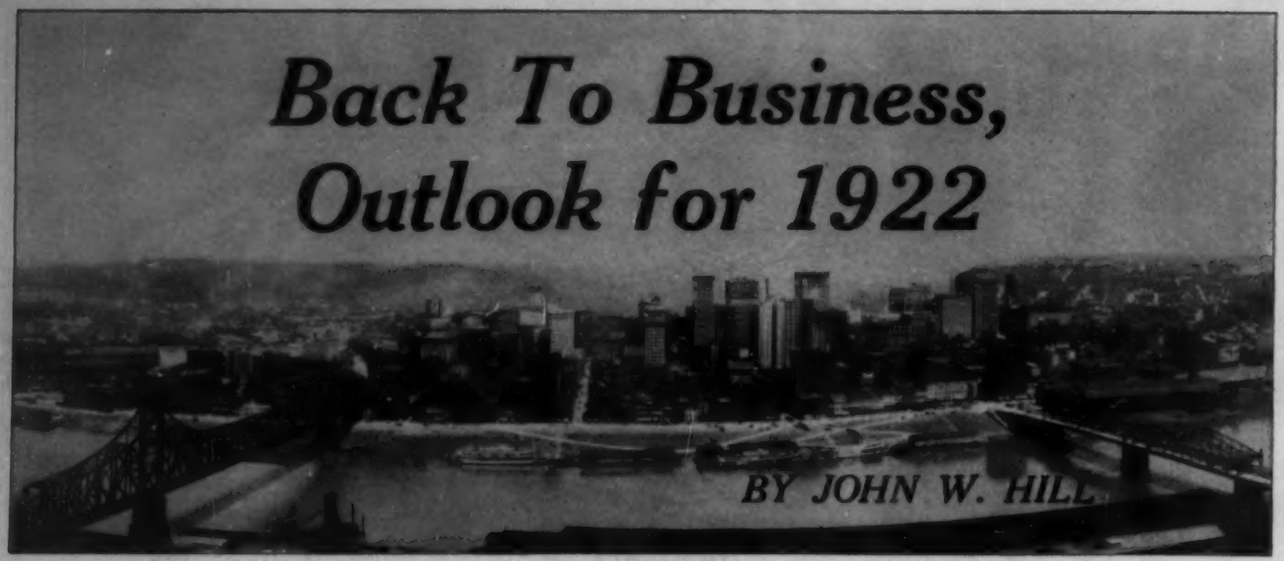
The year has witnessed the inevitable backlash of a period of unparalleled economic extravagance. The world having spent lavishly of its accumulated wealth, has been struggling to regain solid ground through the depths of severe and far-reaching readjustment. The cardinal point of it all, however, is that great progress has been made toward the goal of rational stability. The fact that many important factors are yet to be resquared satisfactorily to the new conditions of today should not be allowed to blind the perspective.

If there was real cause for uncertainty and fear one year ago, there is equal ground for the reassertion of reasonable confidence at this time. Basically, business is founded upon credit. Seldom has the country beheld such a prodigious backing up of idle capital as has flooded its banks and strong vaults in recent months. Unless these wells of potential strength are tapped by a rebirth of enterprise and initiative this very surplus must spell stagnation and continued economic distress. Inert credit, however, in time provides its own cure. The symptoms of such a reaction already are to be seen in the extraordinary revival of the bond market. This tends to forecast the galvanizing influence upon the business situation, of renewed confidence and expansion. With respect to its most fundamental factor, the business outlook is sound and reassuring.

Expressed in profits and turnover the coming year may not compare favorably with the high-tide movements of the recent past. Yet the situation will have the might of health and normality. It will rest and will be built upon a firm foundation.

What the business situation most needs at present is a rejuvenation of rational confidence—a rebaptism of courage and faith. This is the spirit that has given America its commercial greatness. The ringing slogan of the new year should be "Back to Business". The rewards will be there for those who will seek them aggressively.

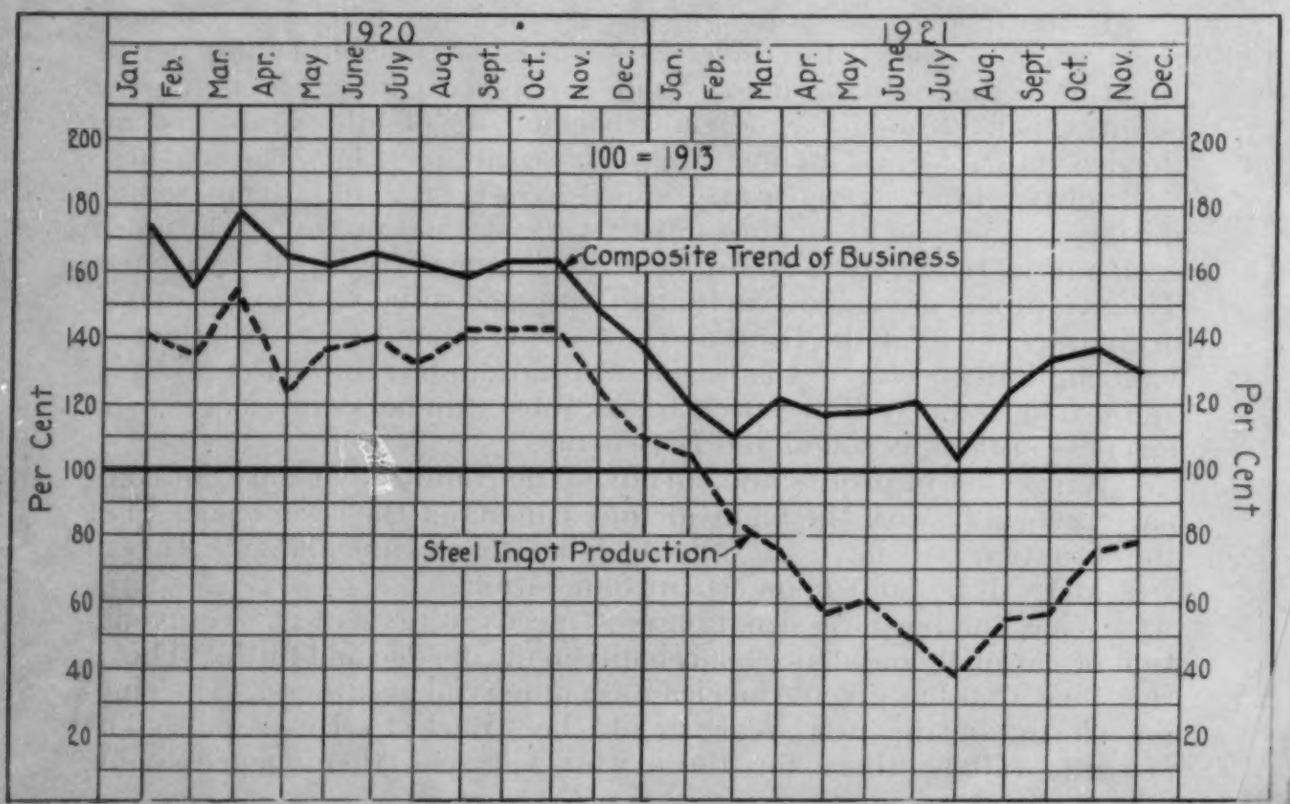
Back To Business, Outlook for 1922



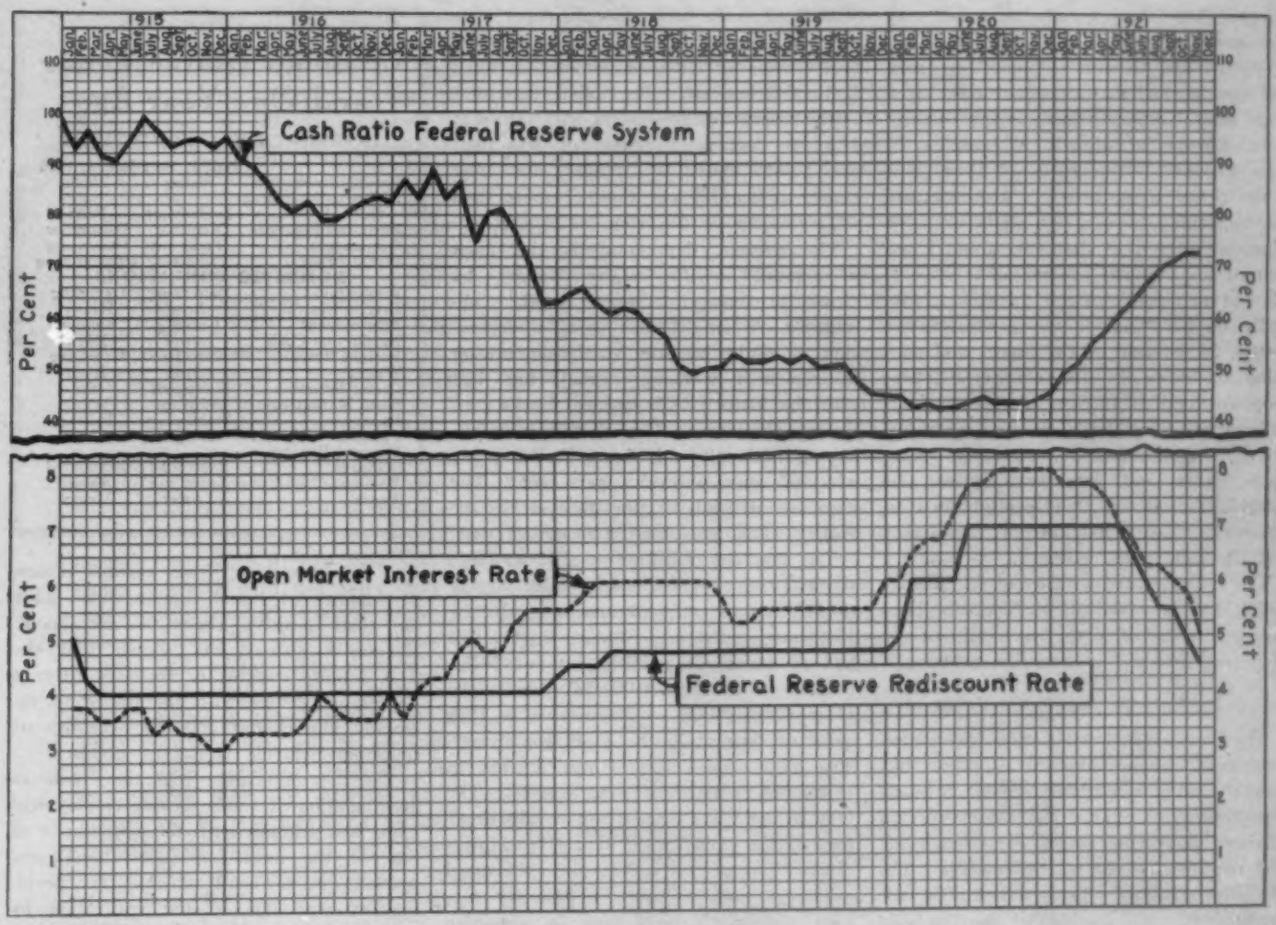
BY JOHN W. HILL

FUNDAMENTALLY and on the surface as well, the status of business at the dawn of 1922 is far more favorable than 12 months ago. Then industry was midway in its historic decline from dizzy heights of inflation. Prices were falling sharply, unemployment was spreading, production was receding and business men were still dazed and unnerved from the first shock of a great worldwide economic catastrophe.

The entire industrial structure was tremendously strained and out of joint. Recovery was inconceivable until far-reaching readjustments of prices, of wages, of costs and above all, of ideas of service and of profits, had been made. Careful study of the situation reveals that of all of the many complex adjustments recognized as essential to economic health one year ago, fully 80 per cent now have been wholly completed or nearly so. Some of them, such as freight rates, wages for coal miners and railway employes, price disparities and the reduced purchasing power of the farmer and of Europe, have been carried over as problems for which solutions must be worked out during 1922. This explains why the industrial skyline is still ragged and uneven. A few powerful economic factors have been able to resist, for a time, the leveling influence of healthy deflation. But the central and overshadowing fact is that the bottom of the decline in activities was struck in July and that the gradual rise which started at that time, continued until the approach of the year-end period for inventory and normal seasonal let-downs. The present lull in activities has given no indication that it will approach the low levels seen last summer, and the under-



GENERAL BUSINESS, AS MEASURED BY A COMPOSITE AVERAGE LINE OF BASIC FACTORS, TURNED UP IN JULY—INGOT PRODUCTION FOLLOWED THE GENERAL TREND



HOW THE RISE OF THE CASH RATIO OF THE FEDERAL RESERVE SYSTEM AND FALLING LOAN RATES HAVE BEEN SIMULTANEOUS—BOTH REFLECT BETTER FINANCIAL CONDITIONS

lying trend continues unmistakeably forward.

Sound Foundation is Laid

Four great commanding developments in the past year have combined to build a solid foundation for business resumption and to lift the general economic situation to a new level of promise for 1922. They are:

1. Encouraging progress in the direction of international diplomatic and economic sanity.
2. Cessation of the momentous price decline and the appearance of stabilization, particularly in raw materials.
3. Phenomenal easing of credit and the fall of money rates.
4. Absorption of surplus stocks in many lines and great strides made in industrial and labor liquidation.

These fundamental developments strike the keynote of the outlook for 1922 and form the broad groundwork for the steadily growing spirit of confidence in the future. They guarantee that the opportunity to do business is here. The current year promises to be characterized by a "back to business" movement on a normal basis. Present indications are for increasing production, dwindling unemployment and fairly satisfactory competitive trade conditions during the year. Sharp competition will encourage the trend toward mergers and other effective means of cutting operating costs and of keeping prices within the range of reduced buying power. Profits, while narrow, should be better than in 1921 and the quality of goods and services should continue to improve.

The early part of the year probably will see the culmination of readjustments as yet uncompleted, and the rate of general recovery will depend, in large measure, upon the speed and thoroughness with which these are made. Cheap raw materials tend to absorb cheap capital, with resulting business expansion. Thus the present easy money conditions combined with low prices for basic commodities constitutes a strong forecast of moderate revival in 1922. No swiftly rising tide of trade activities seems probable now, but it is conceivable that impetus to improvement might be given by the pressure of idle funds seeking employment or by some great stimulating economic development of worldwide significance.

In recent months domestic affairs have been largely overshadowed by momentous changes that have been developing in the world outlook. A few months ago Europe was immersed in a black sea of despair, but the outlook is now better.

Encouraged by the success of the Washington conference and urged by the dire necessities of the situation, Europe is attacking the stupendous problem of reconstruction and of stabilizing its financial and economic situation. The task involves putting the reparations upon a practical basis, checking paper inflation, enforcing the balancing of national budgets, eliminating war fears and lopping off topheavy armament costs. Some disposition of the huge overhanging international debts inherited from the war is an integral part of the general problem. It is impossible to foresee what form the solution will take but the outlook for Europe has been vastly improved by the plans now in the making for international financial and economic conferences early this year.

European Interests Are Vital

This country has a vital interest in European affairs. This is true because of the allied debts of $11,000,000,000 and because of the importance of Europe as a market for American goods. It may be assumed that this government, while encouraging Europe to take the initiative in helping itself, will extend co-operation in any measure looking toward the rehabilitation of the economic situation abroad.

Europe has been aptly described as the world's factory. In order to keep busy and to prosper it must buy raw and semifinished materials and food on a large scale. America has come to depend upon Europe to absorb its surplus of these groups of commodities. There is a tendency in some quarters to deprecate the importance of export trade to these countries. It is true that only about 7 per cent of total annual production is exported; but this does not tell the story. Normally 66 per cent of the production of cotton, 50 per cent of the copper and one-third or more of the country's wheat crop are sold in foreign markets, principally European. Loss of these markets, or their demoralization, seriously reacts upon great and important groups of American producers, whose plight in turn adversely affects the butcher, the baker and the candlestick maker.

The improvement actual and sentimental which has occurred in Europe has been promptly reflected in the movement of the mercurial and sensitive foreign exchanges.

Credit Conditions Much Better

The most spectacular and significant movement in the domestic situation has been the pronounced improvement in financial conditions. This has been reflected in rising bank reserves, in decreased loans and deposits and in falling interest rates. Broadly speaking, the betterment in the credit situation has gone hand-in-hand with declining prices, falling wages and dwindling volume of business with resulting smaller requirements of credit. But more than that, it has reflected great gains in gold reserves and the thawing of the huge mass of frozen credits.

The banking situation is mirrored in the federal reserve system. In 1921 combined gold reserves of the 12 regional banks composing the system increased by more than 40 per cent to a total of $2,870,000,000. Rediscounts of paper for member banks dropped 56 per cent, while federal reserve notes in circulation have declined 28 per cent. The cash reserve ratio of the federal reserve system, which stood at 44.5 per cent last January or less than five points above the danger line, now stands at near 71 per cent, or more than 30 points above the zone of danger.

The present depression is the most pronounced in the entire history of American finance. Ordinarily the curtailment of bank loans during a depression is slight because of the borrowing to replenish working capital, but last year the loans of 820 national banks contracted 27 per cent. The maximum shrinkage in national bank loans in the panic of 1907 was only 5.5 per cent. The immense strength of the federal reserve system alone prevented a financial crash.

The fabulous piling up of gold on these shores in recent months has added largely to the increase in bank reserves. In the 15 months ended with November, America had an excess of gold imports of $815,000,000, of which $638,000,000 came in the 11 months of 1921. Gold imports in 1921 were the largest in the country's history. The high prewar record was reached in 1898 with a total of $158,163,000. The flow of gold has come from nearly every part of the globe, much of it from impoverished Europe. It reflects the unbalanced exchange situation and the difficulty foreign purchasers have had in obtaining credit advances from this country. The United States now has $3,545,000,000 of gold or nearly one-half of the total world stocks. Of the country's stock of money gold 80 per cent is in the federal reserve system. Under the present system of small reserves there is nearly 20 billions of unused credit.

The significance of the present credit situation becomes more striking when the experience of 1920 is recalled. Then it was the exhaustion, from various causes, of supplies of liquid capital which gave the final positive check to the boom. Economic history has shown that the first definite impetus to recovery after a depression comes with the desire to reemploy idle capital and the necessity of replacing depleted stocks of goods.

The first indication that there was an accumulation of funds seeking employment came last autumn with the appearance of one of the most impressive investment markets in financial annals. Its development was due to the realization by investors that lower wages for capital were approaching. It also reflected the improvement in fundamental conditions and the growing confidence in the future.

One interesting feature of the bond market is the fact that there is no longer the pressing necessity to use investment credit for current business needs as there was a year ago. Much of the industrial financing early in 1920 was for the purpose of pulling business "out of the hole." Now it is for financing plans for building the framework of the approaching period of business expansion. During the first quarter of last year 40 per cent of financing was for current needs. In the second quarter the ratio was 50 per cent while in the third and fourth quarters, it was 17 and 15 per cent respectively.

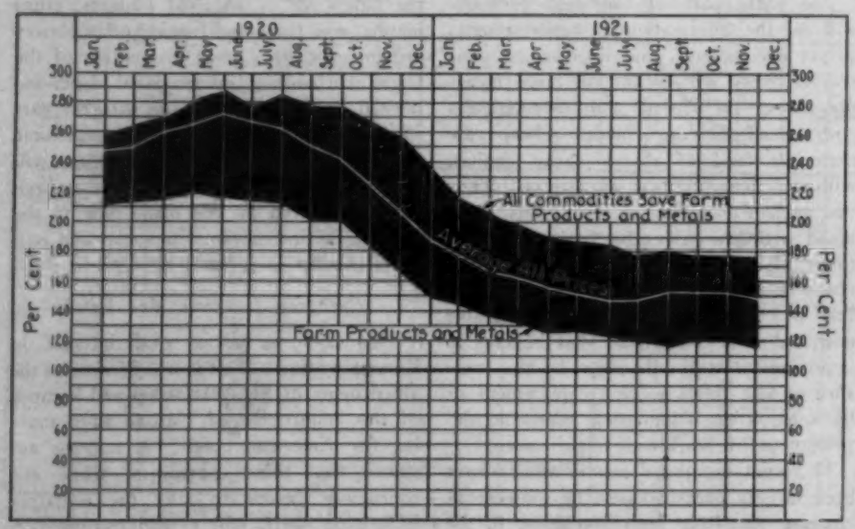
Capital Accumulation large

Despite the fact that 1921 was a year of business depression, the country's accumulation of capital was enormous, being computed at $8,800,000,000. Fully $4,500,000,000 of domestic securities, exclusive of refunding operations, were purchased out of the total savings. Open market commercial loan rates have fallen from 8 per cent one year ago to 5 per cent now. Federal reserve rediscount rates have been reduced from the peak of 7 per cent to 4½ per cent at some districts and further reductions are expected.

Some authorities believe that this tre-

Economic Status Today and One Year Ago

INTERNATIONAL CONDITIONS	Jan. 1, 1921	Jan. 1, 1920
Foreign Exchanges	Rising	Weak
European Economic Outlook	Improving	Poor
European Finances	Mending	Dangerous
Armaments	To be cut	Increasing
World Peace	Promising	Unpromising
DOMESTIC CONDITIONS		
Production	Increasing	Declining
Inventories	Low	Heavy
Employment	Gaining	Falling
Production Costs	Lower	High
Freight Rates	Excessive	Excessive
Wages	Lower	High
Credit Situation	Excellent	Bad
Bond Market	Buoyant	Weak
Prices	Stabilizing	Falling
Failures	Large	Large
Farmers Buying Power	Restricted	Restricted
Business Confidence	Spreading	Absent
Taxes	Lower	Heavy



FARM AND METAL PRICES ARE BELOW THE GENERAL PRICE LEVEL, WHILE OTHER COMMODITIES ARE ABOVE

mendous pressure of idle capital eventually will burst through the dykes and inundate the land with another ruinous flood of inflation. Others believe that the restraint of chastened bankers and business men will prevent a repetition of the 1920 experience. Certainly thus far bankers are proceeding cautiously, largely because they are still caring for a great many financially weak companies who have not yet been able to re-establish themselves. The large number of commercial failures testify to the existence of numerous cases of individual distress despite the fact that liquidation is nearly over in its main respects.

It is clear that the immense volume of available credit will seek employment eventually. Some of it will be used in fostering a moderate business recovery as conditions warrant. But there is another channel into which it may flow. Its existence together with low rates, will attract bidders from all over the world, for United States is the great reservoir of gold and capital. The demand from Europe, providing those countries are able to devise a sound method of economic reconstruction, will be particularly great. Many farseeing American financiers believe that the interests of the country will be best served by employing a considerable share of the surplus credit resources for the rehabilitation of Europe rather than for excessive and harmful expansion at home.

An analysis of the trend of industrial activities during 1921 shows that July marked the turning point. In the accompanying chart depicting the curve of business there is shown a composite of the average movements of bank clearings, outside of New York city, pig iron production, cotton consumption, railroad gross earnings, square feet of building construction, coal output, and Bradstreet's wholesale prices. These are fundamental indices of the industrial situation and they measure in a reasonably accurate way the fluctuations of general business.

Industry enters the year under more favorable conditions, in many respects, than those prevailing one year ago. Labor efficiency is higher, unit production costs are lower and wages in the steel and some other industries have been fully liquidated. One of the most encouraging points of comparison with last year is the low condition of inventories of manufactured goods. High inventories, both in the quantity and in price, constituted the most vulnerable part of industry's position at the close of 1920. These have been written down heavily by most companies and wherever possible they have been worked off or reduced. Raw material stocks of some commodities are still large but not so heavy in any quarter as early in 1921.

The fall of wholesale prices which ended last summer was the most drastic ever known. The most pronounced decline in wholesale prices in the previous economic history of the United States occurred following the panic of 1872 when prices descended 39 per cent over a period of 72 months. In 1920-21 prices fell 46 per cent in 13 months. Since midsummer prices have fluctuated within a fractional range and every indication now points to the cessation of the violent fall. Most economic authorities believe that the general trend of prices over the next 10 years will be downward, though there probably will be interrupting zigzag movements at intervals.

All this means that greater stability and certainty will attend business operations in the future. It is significant that raw materials which always start up or down before other prices and move faster and further than they do, have in most cases clearly reached bottom.

With materials cheap and stable, or rising, as in some cases, there no longer exists a reason for consumers' reluctance to cover future requirements in part at least, or for bankers' refusal to finance such purchases. This should be one of the forward developments of 1922.

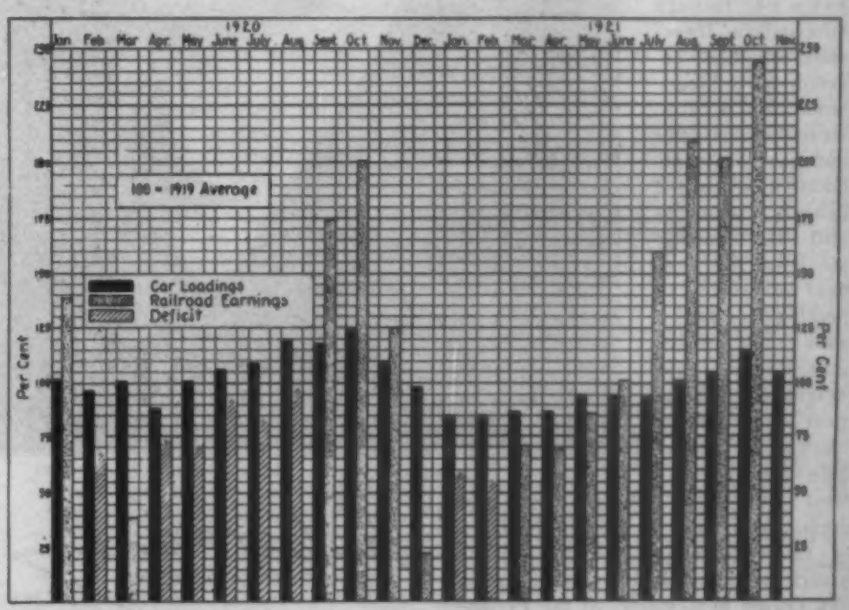
Price Disparity an Obstacle

The most serious obstacle to general revival is the disparity in prices. The old price relationships between commodities have been wrecked with serious results to the purchasing power of large and important consumers. The farmers have been the worst sufferers in this respect and their plight has seriously reacted upon almost every branch of manufacture and distribution. It is estimated that the farmers' purchasing power has shrunk more than 50 per cent since 1920. Deflation in metal prices also has been the most drastic ever seen. The discrepancy in prices is pictured in the accompanying chart showing the curve of the bureau of labor wholesale price index of commodity values. By grouping farm products and metals together it is found that their combined average is only 119 per cent of 1913, while other commodities, excluding these two groups, stand at 176 per cent. The general average is 49 per cent of the prewar level.

Much has been said about the necessity of recuperation in the farmers' purchasing power before industrial revival can begin. The state of general industry and of agriculture bear a relation to each other of both cause and effect.

During the war there was a serious crippling of industrial capacity, especially in Europe. At the same time the production of agricultural products expanded. In this country factories after enjoying a brief boom in 1919 and 1920 suffered a falling off in demand due to failure of foreign purchasing power to revive and exhaustion of banking credit. Farm output, however, did not decline in proportion. As a result there is a relative oversupply of farm products in comparison with the volume of finished goods. This is the fundamental reason for the disproportionate deflation of farm prices.

The unbalanced situation may be remedied either by more industrial production or curtailed agricultural output. The latter is unlikely. The increases already made in industrial output in this country and the prospects of improvement of European purchasing power are developments of great promise for farmer revival. The rise in purchasing power of the farmer will not precede but will follow industrial betterment. The first advance in the direction of increased activities will be made in the industrial centers and not on the farms.


1920
1921
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June July Aug Sept Oct Nov
100 = 1919 Average
Car Loadings
Railroad Earnings
Deficit
Per Cent
Per Cent

HOW RAILROAD EARNINGS AND FREIGHT TRAFFIC HAVE GAINED IN RECENT MONTHS

Business Wins Washington's Aid

Constructive Program Is Developed by Administration To Advance Commercial Interests of Nation—Secretary Hoover Makes Department of Commerce an Effective, Functioning Branch—Tax Reform Started—Business Methods Applied to Government

BY E. C. BOEHRINGER

"BACK to Business" has for Washington the collateral meaning of economic restoration and political prestige. A new national administration is rounding out its first year in office. A new congress has concluded a special session of seven months and is now sitting in its first regular session. An unusual opportunity has been afforded in the past year both to the administration and to congress to be of real service. The thing economically sound for the country should have been the right thing politically. What does an accounting of the stewardship reveal? First and foremost, that the administrative end of the government has rendered positive and immediate assistance to business struggling with the backlash of the Great War. Second, that when viewed through nonpartisan lenses congress has enacted much legislation of a constructive character and has been especially kind to the farmer, who is still the cornerstone of the business structure. In peering ahead, it should not be forgotten that the imminence of the next congressional election cannot help but exert a most stimulating influence upon congress. Many important problems are yet to receive attention in the legislative branch including those of taxes and tariffs. Owing to incapacity of the President and the deadlock between a Democratic White House and a Republican Capitol Hill, the economic and political year in Washington did not open until March 4. The induction of Warren G. Harding as President and the formation of a new cabinet ended this stalemate. The changes consequent to the first political upheaval in eight years released new energies. The cabinet, topped by Charles E. Hughes as secretary of state, satisfied all but the incorrigibly partisan. The wish of the incoming executive that March 4 be observed only be renewed activity in trade and industry was auspicious.

Herbert Hoover

Every administrative department of the federal government has lent trade and industry a helping hand in the past year. The department of justice no longer casts a menacing shadow over lawful as well as unlawful practices. The department of labor, although under somewhat of an eclipse, has ceased to be a mere puppet of the American Federation of Labor. The department of state is making history with its conduct of the limitation-of-arms conference, whose successful outcome will be reflected more in the office than in the home. Great doses of speed have been injected into the postal system. The treasury and the federal reserve system have been steadied by the hand of one of the ranking bankers of the country. Great credit is given the system's management despite persistent criticism from some quarters, especially in the Southern states. Helpful as these new policies and activities have been they all have been overshadowed by Herbert Hoover's direction

What the Department of Commerce Should Be

BY HERBERT HOOVER

WE WANT no paternalism in government. We do need in government aids to business in a collective sense. In a department we do not want to either engage in business or to regulate business. We need a department that can give prompt and accurate diagnosis from both a foreign and domestic point of view of economic events, of economic tendencies, of economic ills; that can promptly and accurately survey economic opportunity, economic discrimination and opposition; that can give scientific advice and assistance and stability to industry in furnishing it with prompt and accurate data upon production, supplies and consumption; that can co-operate with it in finding standards and simplifications; that can by broad study promote national conservation in industry and the elimination of waste; that can study and ventilate the commercial side of our power possibilities; that can study and advise national policies in development of rail, water and overseas transportation; that, in fact covers, so far as government functions can cover, the broad commercial problems of trade, industry, and transportation. This can be accomplished more by co-ordination of existing governmental facilities than by increased expenditures.

of the department of commerce and his direct, personal assistance to the President. His guidance of the national unemployment conference which convened in Washington on Sept. 26 at the behest of the President translated into fact the basic reason for the conference. His reorganization of the department of commerce, more particularly the bureau of foreign and domestic commerce, was an accomplishment greater than that of any other cabinet officer, having in mind the possibility of aiding trade and industry. The department of commerce now is on the map for the first time since it became a separate entity in 1914.

Conceived originally as a virile connecting link between manufacturers and exporters in the United States and trade opportunities abroad, the bureau of foreign and domestic commerce long since had succumbed to the lassitude of the federal service and become the happy hunting ground of long-winded consular reports of dubious worth and the publisher of a daily bulletin in which, hopper-like, reports were dumped and printed without interpretation, little editing and less order. This was the state of affairs Secretary Hoover inherited. Seeing great possibilities in the bureau because of his European experiences during the war and his recognition of the need of foreign trade, he went before congress and came away with an appropriation of $250,000 available July 1. To direct the rejuvenation of the bureau Secretary Hoover installed Dr. Julius Klein as director on June 22.

Then, in July and August, Secretary Hoover set up 14 separate commodity divisions, each having its own specialized field and charged with the advancement of foreign trade peculiar to its commodity. Parenthetically, the first commodity division organized was the iron and steel one. The other 13 commodity divisions are agricultural implements and vehicles, automotive, electrical goods and machinery, fuel, boots, shoes and leather, lumber, foodstuffs, industrial machinery, rubber, textiles, chemicals, paper and specialties. In explanation the bureau states:

"The men appointed to head the commodity divisions are all recognized experts in their particular field. They were selected with the help and advice of the leading organizations in each field. Through their specialized knowledge and training the bureau hopes to be able to be of much direct and personal service to the important export industries of the United States. It is the duty of these men to keep in the closest possible touch with the centers of the industries they serve by way of appropriate commercial organizations, trade papers, editors and the manufacturers and merchants individually. They are charged with the responsibility of ascertaining the character of the information most urgently needed by each industry, or which would be most generally useful during different seasons and under varying conditions and circumstances. With this information at hand they make use of the department's existing worldwide facilities, consisting at present of more than 600 foreign representatives in the form of consuls, attaches and trade commissioners, in promptly obtaining the exact information desired. Their long experience in and special knowledge of the peculiar problems connected with each industry should result in the rendering of reports which will be understood in their true significance by the American business men concerned. These men also see to it that reports reaching the division from all sources are properly interpreted from an industrial standpoint and are immediately submitted to the points where they will do the most good."

These 14 commodity divisions placed on a business basis, attention was turned to the geographical phase of export business. In place of the single European division which covered not only Europe but also Africa and Canada, two new divisions were established—Eastern and Western Europe. Then followed the Near East, Latin-American and Far Eastern divisions. These geographical divisions supervise the preparation of reports and replies from interested American business men from the geographical point of view, and supplement the commodity divisions. Of a wholly different character are the divisions of transportation and commercial laws, which followed the geographical divisions. The division of commercial laws has begun a worldwide survey of the commercial laws of foreign nations.

Not yet satisfied that he had exhausted the bureau's possibilities, Secretary Hoover discontinued the daily publication of *Commerce Reports* and on Sept. 5 made it a weekly, gave it a cover that smashed all tradition by looking unlike a government publication, ordered commodity division chiefs to prepare weekly articles and summaries and made the publication of real value to both manufacturers and exporters. As a balancing aid to domestic business, Secretary Hoover inaugurated a monthly *Summary of Current Business*, which is still in process of refinement. Production statistics are assembled, and trends ascertained and charted.

What is more, these departures of Secretary Hoover from the rut into which even whole departments fall are proving their value. The commodity divisions supply an example. The iron and steel division is now arranging for greater participation of American producers in trade openings abroad for iron and steel; to obtain wider acceptance abroad of American iron and steel standards and specifications; to keep the American producers informed of foreign production, new processes, current prices, exports and imports, changes in tariffs, and the like. The industrial machinery division is in touch with some 4000 manufacturers as yet not organized, and is forming special committees to further exports in directions from which exporting has never been considered. The fuel division is making a thorough survey of American and foreign

oil interests throughout the world. The transportation division is furnishing free freight rates by land or water from anywhere to anywhere—a service rendered gratis by no one else.

Scarcely had Secretary Hoover completed this task, the magnitude of which no one can appreciate unless he himself has become enmeshed in the governmental red tape that snarls at every turn, when the national unemployment conference that had been called by the President convened on Sept. 26. Excepting possibly Secretary Hughes' handling of the arms conference, no cabinet officer last year undertook a problem so loaded with political and economic dynamite. The President and Secretary Hoover, long before the conference assembled, had searched out the trouble and arrived at the remedy their diagnosis called for, and the sixty-odd representatives of capital and labor and the people who attended the conference signed their names to the Harding-Hoover prescription.

Raid on Treasury Blocked

As the summer wore on the unemployment situation became more acute daily. Federal officials kept their fingers on the pulse constantly but not until unemployment and the government became linked up in printed word and conversation did Washington believe the time had come to use the knife. The greater the volume of unemployment became the more it was argued that relief should be accorded by the federal government, and relief was synonymous with a raid on the public treasury. Practically the first suggestion of a federal "dole" prompted the call for the conference. Secretary Hoover's task, to which he had been assigned by the President, was to thrust the unemployment problem back where it belonged—on the states and municipalities. The conference was in session, barring some recesses, from Sept. 26 to Oct. 13. Contentious questions concerning wages and hours of labor and the open and closed shop were adroitly smothered, the conference accepted unhesitatingly the recommendations contained in the agenda, suggestions for the formation of local committees were broadcasted and since Oct. 13 the unemployed question has been effectually disposed of. Only those close to Secretary Hoover know of the tortuous course through which he safely steered the conference ship and how he stayed a movement in favor of a governmental "dole" for the jobless which has cost Great Britain more than $200,000,000 in 16 months.

Had congress in the past year enacted no legislation other than the act creating the bureau of the budget it would have merited praise. Coming as it did on the heels of the orgy of war spending, the act has greater significance. Chief of the functions of the newly-created bureau is to "clear" the appropriation requests of all government departments and agencies—a procedure even a mediocre business man would insist upon but which the government has never adopted. By Sept. 15 of last year the requests of all department and commission heads were in the hands of the budget director; between then and Dec. 5, when the budget for the fiscal year beginning next July 1 was transmitted to congress by the President, these requests were scanned and pared. As Budget Director Dawes declared in his statement to congress in December, "for the first time in the history of the country a national budget has been prepared based on estimates from the spending departments acting under a strong and continued executive pressure for economy and efficiency".

The budget transmitted to congress on Dec. 5 estimated governmental expenditures in the fiscal year beginning next July 1, for which congress is about to appropriate, at $3,505,754,727. This compares with $3,967,922,366 estimated as the expenditure in the fiscal year ended next June 30 and actual expenditure of $5,538,040,689 in the fiscal year ended last June 30. The estimate of the year beginning next July 1 therefore is more than $2,000,000,000 under the actual expenditures of the year ended last June 30. This evidences economy which is reflected in every home of the land through a lightening of the tax burden. In the accompanying table is given the summary of budget expenditures for 1923, estimated expenditures for 1922, and actual expenditures for 1921, exclusive of postal service expenditures paid from post revenues.

A feature of the budget act which cannot fail of good results is the coordination of sales and purchases by all departments and independent agencies. More times than a government should admit, one department has been selling for a fraction of their real value supplies which another department is buying in the open market. It has also frequently happened—to the detriment of the treasury—that government departments have bid against one another for the same materials. This is now a thing of the past. Whenever a department desires to sell surplus materials or lay in supplies its intention is "cleared" through a branch of the budget director's office.

Still another phase of the act is the role of the director of the budget in acting as agent for the joint committee on reorganization, which under a resolution of May 5, 1921, has been studying governmental functions with an eye to regrouping. This committee has been at work since May and is expected to submit its report sometime in January. It is proposed that the treasury be relieved of many functions not strictly financial, that all of the shipping and ship regulatory activities of the government save the

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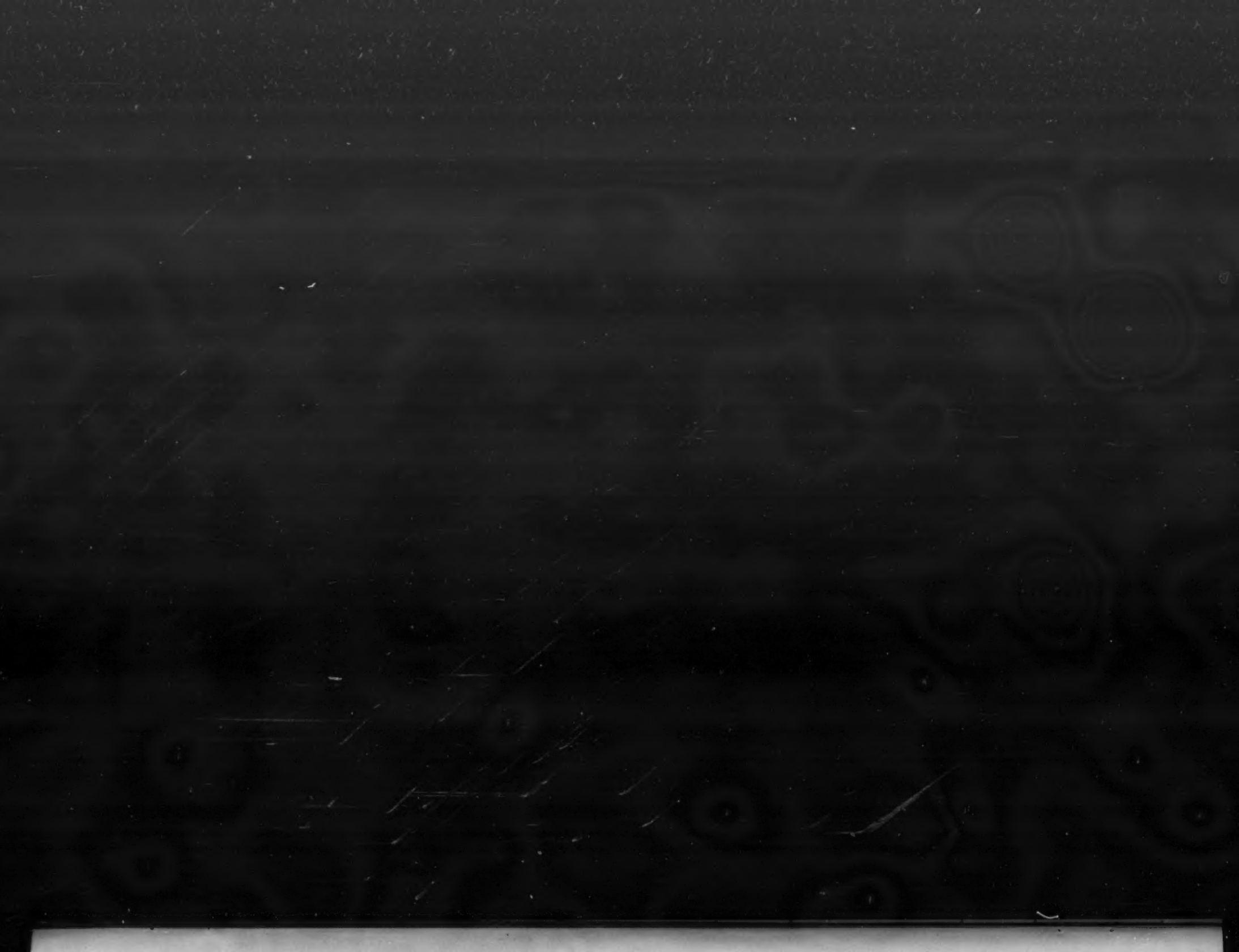
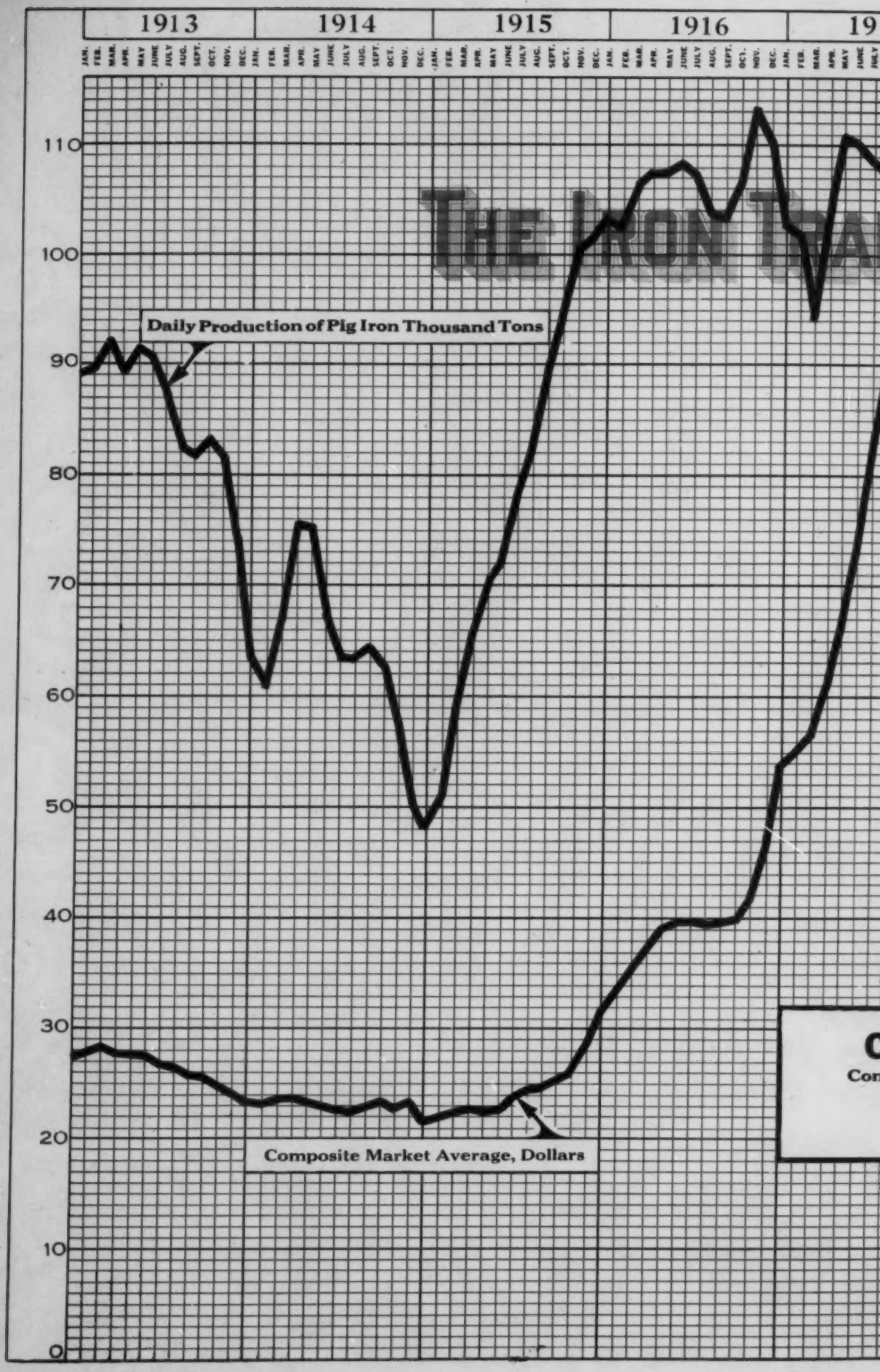
COMMERCE REPORTS

ELABORATION AND IMPROVEMENT OF COMMERCE REPORTS TYPIFIES SPIRIT OF INTENSIFIED SERVICE TO BUSINESS WHICH ANIMATES DEPARTMENT OF COMMERCE TODAY




1913
1914
1915
1916
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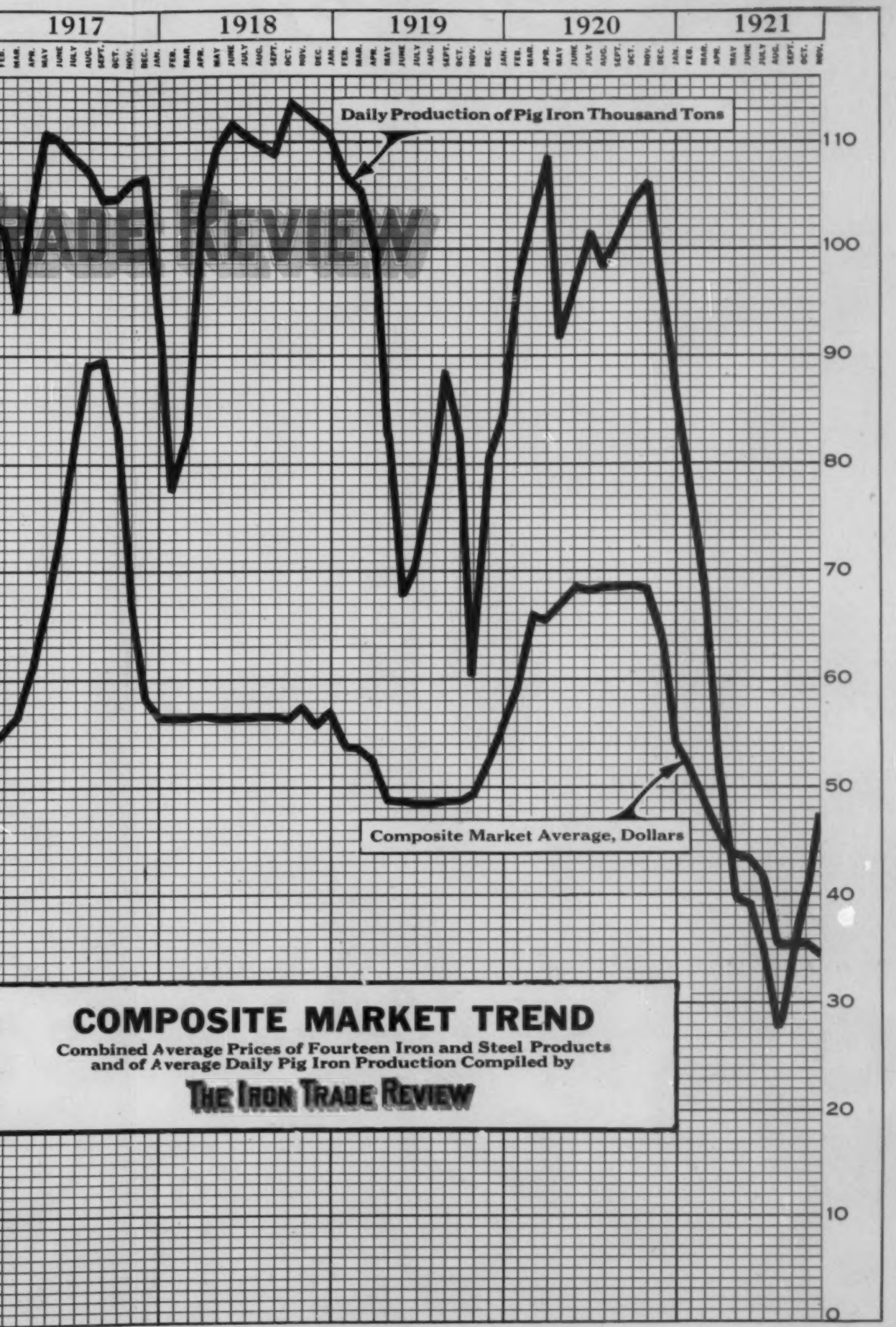
Daily Production of Pig Iron Thousand Tons
Composite Market Average, Dollars


1917
1918
1919
1920
1921
Daily Production of Pig Iron Thousand Tons
Composite Market Average, Dollars
110
100
90
80
70
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10
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COMPOSITE MARKET TREND
Combined Average Prices of Fourteen Iron and Steel Products
and of Average Daily Pig Iron Production Compiled by
THE IRON TRADE REVIEW

shipping board be grouped under the secretary of commerce, for example, all engineering activities may be lodged in the department of the interior. If objections can be overcome the war and navy departments may be merged into one department of national defense and the resultant vacancy at the cabinet table allotted to a new department of public welfare. Every proposed reorganization of the departments in the past has precipitated a storm of protest and brought little or no accomplishment; whether this precedent will stand may be seen early in 1922.

Taxation Receives Much Attention

In the special session of congress which convened on April 11 and adjourned on Nov. 23 the tariff and taxation, as was to be expected, played the stellar roles. The tax bill is a law today while the Fordney tariff bill still reposes in the bosom of the senate finance committee. Complaint concerning the tax bill is not so much that it does not reduce sufficiently the volume of taxation as it is that the proper sources of revenue were not tapped. Consideration of the tax bill, especially in the senate, was marked by the persistence of the advocates of the sales or turnover tax, yet when the test vote came in November the proposal marshalled insignificant support in the senate. Admittedly the tax bill will not stand for more than a year, as receding governmental expenditures will permit of a further lessening of the tax burden, and it is expected that the sales tax will be heard of again. The great bulk of income taxpayers will benefit beginning with the March 15 payment from the increase in the exemption from $2000 to $2500, and the increase of from $200 to $400 each for children. Including the normal tax, the maximum income tax, also beginning March 15, is 58 per cent. The shipping and traveling public will benefit from the lifting of the 3 per cent tax on freight charges and 8 per cent tax on passenger and Pullman fares as of Jan. 1. The excess profits tax also went on Jan. 1 but in its stead came an increase of 2½ per cent—to 12½ per cent—on the normal income of corporations. Numerous small nuisance and luxury taxes also went on Jan. 1.

Discussion of tariff legislation left its imprint upon almost every month of 1921. Informal hearings were held in January and February by the ways and means committee of the house, resulting in star-chamber sessions of subcommittees through March, April and May and finally the introduction of the Fordney bill in the house in the first week of July. By Aug. 1 the bill had been transmitted to the senate and referred to the senate finance committee. Mid-August saw the leaders of the industry and its various branches testifying before the committee. The difficulties of writing a permanent tariff law amidst decreasing production costs abroad and an ever-fluctuating exchange became so manifest in September that the Fordney bill was laid aside. Even the introduction of antidumping provisions and the American valuation plan failed to meet the situation. Had a Democratic congress been writing the law the task would have been simple—one of reducing rates and adding to the free list. For a Republican congress to impose equitable rates and cut short the free list proved another matter. Interwoven in the tariff discussion were such questions as stabilization of exchange, which in turn went back to the question of German reparations, ascertainment of comparable production costs here and abroad, and how to bar a flood of imports from such nations as Germany and the newly-created states of mid-Europe without at the same time building a tariff wall between the United States and the European states in our debt. The President, in his message to congress at the opening of the regular session on Dec. 5, urged early enactment of the Fordney bill and the extension of the powers of the federal tariff commission to permit it to "proclaim American valuation under prescribed conditions on any given list of articles imported." There is promise now of a successor to the Underwood act by spring.

Legislation Benefits Farmer

Without doubt the farmer benefitted most from congress in 1921 and for the reason, chiefly, of the formation of the so-called agricultural bloc in the senate. It should be recalled in this connection that more than one acknowledged leader in the iron and steel industry has iterated and reiterated that the buying power of the farmer must be restored before genuine prosperity can return. Secretary Hoover himself deplored the overliquidation of the farmer. The passage of the emergency tariff in May and its indefinite extension in November provided exclusively for the farmer and afforded him protection from foreign imports of grain and foodstuffs. There also were the Capper-Tincher bill, regulating the grain exchanges of the country; the act giving the secretary of agriculture supervision over stockyards and packing houses; the Curtis bill setting up a revolving fund of $25,000,000 for the use of farm-loan banks; the agricultural credits bill whereby $1,000,000,000 was appropriated for the War Finance Corp., and the Kenyon bill increasing the interest on farm-loan bank bonds without increasing the rate of interest to the farmers themselves. In the past year congress also provided for the extension of the Alaskan railroad, made peace on Oct. 18 with both Germany and Austria, appropriated $75,000,000 for good roads, provided additional credit for the Philippine government in a financial crisis, limited immigration, and restored credit in South America with the passage on April 20 of the Colombian treaty. Nor should it be forgotten that through a courageous stand of the President between $3,000,000,000 and $5,000,000,000 was saved by postponement of the soldier bonus issue. In the special session the house and senate passed 136 bills and resolutions, while 135 additional measures were passed by the house and are pending in the senate.

Pittsburgh Base Under Fire

For the Western and Southern Association of Rolled Steel Consumers 1921 will stand out as the year that saw crowned their efforts to indict the Pittsburgh basing point practice. On April 30 the formal complaint was issued by the federal trade commission, after consideration of the basing point matter since July 9, 1919, when the first conference on the matter was held at Washington. On Dec. 6 the complaint in the case was amended, and the promise is held out that the hearings will be inaugurated in January. Although the steel industry necessarily is divided on the basing point issue it apparently stands solid on cost reporting, an issue dormant since the summer of 1920 when independent producers enjoined the trade commission from compelling them to submit monthly cost reports. On Nov. 25 the trade commission reopened the matter by demanding the right to inspect the books of 22 iron, steel and coke producers united in the Claire Furnace case to combat the commission, a demand that was refused in the district supreme court.

So far as governmental initiative is concerned, the iron and steel industry received practically no assistance in 1921 in the matter of lower freight rates. True, export rates were reduced in September and rates on ore in eastern and southern territory in October, with minor adjustments in the rate structure in process all through the year, but the interstate commerce commission's strict adher-

(*Concluded on Page 27*)

Wage Deflation Still Incomplete

Trade Union Rates Are Holding Up General Averages of American Industries—Need for Greater Balance Is Shown by Analysis of Figures—Iron and Steel 50 Per Cent Above 1914 Level—Reductions Coming More Slowly

WAGES in the iron and steel industry and principal metal trades, figured on a basis of general averages, are down to a point only 50 per cent above the level of 1914. The rate paid common labor in the industry, including the iron ore mines in the Lake Superior district, is exactly 50 per cent above 1914.

Sheet mill workers employed by those companies having an agreement with the Amalgamated Association of Iron, Steel and Tin Workers, are receiving but 18 per cent more than the 1914 base rate. At the peak in 1920, they received 109.5 per cent more than the 1914 rate. Tin mill workers are down to 30 per cent, from 96.5 per cent, at the peak in 1920. Iron mill workers, including the puddlers, are 47.9 per cent above 1914. Their wages when highest in 1920 were 216.8 per cent above the 1914 rate.

The changes in the rates paid to the various classes of mill workers by the United States Steel Corp. approximate those of the independent mills operating under agreement with the Amalgamated association. In the compilation of the accompanying table and chart showing the changes in the Amalgamated mill wages, the rates in effect in November and December, 1921 were used.

Wages paid machinists at present in the principal districts of the country show a general average of 55 per cent above the level of 1914. At the peak in 1920 the average was 125 per cent greater than that of 1914. Union molders in December showed the highest rate, compared with what they received seven years ago. The average still is 99.1 per cent above 1914, while the highest wages they were paid in 1920 averaged 135.7 per cent over 1914. The cities from which data were obtained in figuring union molders' wages are: Boston, Chicago, Cincinnati, Detroit, Los Angeles, Minneapolis, New Orleans, New York, Pittsburgh, St. Louis, Cleveland and Indianapolis. The highest union rate paid at any one time in any of these cities was $1.062 per hour, in Detroit, and that city had the highest, 90 cents, in December 1921.

Union molders' rates were not strictly adhered to during the period of depression even in some of the so-called "union shops"; it often being a case of a man going to work for what he could get, regardless of union affiliations.

The actual earnings of the molders' probably are much less than 99.1 per cent above those of 1914.

An agreement was made by the Stove Founders' National Defense association and union molders in Atlantic City late in December which provides for a wage cut of 10 per cent for stove plates and 5 per cent on some classes of piecework in stove foundries.

The depressed period has been unfavorable for the trade unions to assert themselves; many foundries have managed to shake off union control. They believe the change in this respect is permanent; but where union molders have been out of work the foundries have been idle or operating at a greatly reduced rate. At a meeting of the National Founders' association in New York recently it was pointed out that a year previous the association was combating strikes in the shops of 20 of its members. All were fought to "a successful conclusion", and, it was added, "today the industry is practically free of labor disputes."

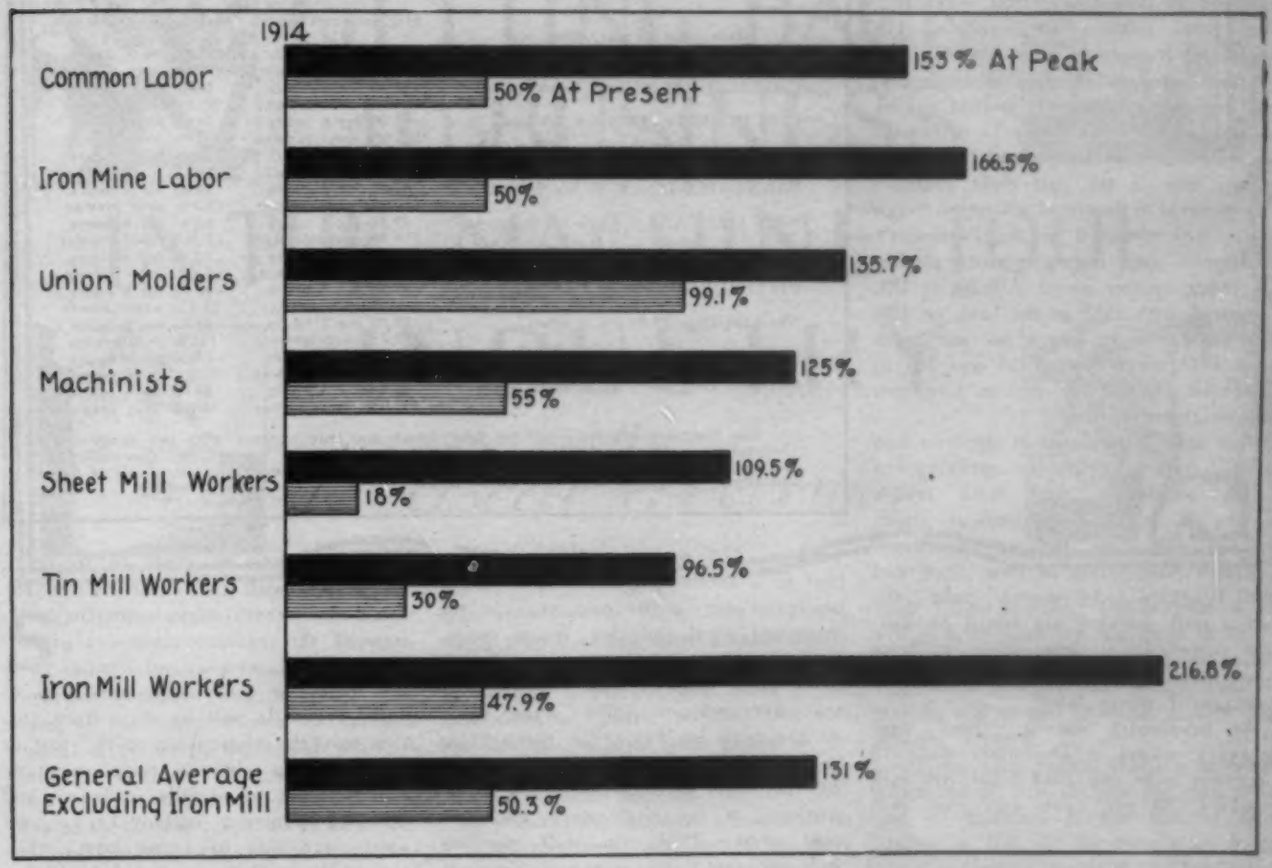
Great progress has been made in liquidating wages in the iron and steel industry. The hourly common labor wage rate paid by the United States Steel Corp., today is 30 cents, as compared with 20 in 1914. The rate paid by the Steel corporation reached the peak Feb. 1, 1920, at 50.6 cents on a basis of 10 hours. This rate was held until May 16, 1921 when it was reduced to 40.5 cents an hour. The next change was made on July 16 when the corporation abolished the practice of paying 50 per cent extra for overtime, this change amounting to a reduction of 8.6 per cent in the laborer's earnings for a 10-hour day. It brought the rate down to 37 cents an hour, figured on a basis of a 10-hour day. On Aug. 29 the rate was reduced to 30 cents. The reductions made by the corporation are fairly illustrative of those put in effect in the iron and steel industry as a whole, but in recent months a divergence has been noted. When the corporation reduced to 30 cents some of the independents cut to 27 cents, and others, down to 25 cents.

The fluctuations in hourly rates paid by the Steel corporation to common labor at the iron ore mines in the Lake Superior district have been substantially the same as those at the blast furnaces and mills. At the peak, 53.3 cents an hour was paid on the basis of a 10-hour day, while at some of its mines in Minnesota as recently as November it was paying 32.5 cents. The general average in the mining districts of Minnesota was 30 cents. In Michigan a few cents less was paid, and on the Menominee range, where work was created purposely to relieve the hardship imposed by protracted unemployment the labor rate dropped to 20 cents an hour, the level of 1914. Wages in general in the iron and steel industry have been reduced more than 40 per cent from the peak figures attained in 1920. In September,

Average Monthly Wages in Iron and Steel Industry, and Number of Employes

	Number of establishments	Number of employes	Payroll for half month	Average wage per month	Average wage year previous
November, 1921	118	124,147	$5,274,084	$92.68	$158.72
October	117	119,269	4,989,018	81.80	160.35
September	106	106,690	4,131,241	77.40	154.58
August	113	102,787	4,362,233	84.88	153.54
July	118	101,638	3,909,739	76.96	144.04
June	117	111,540	4,896,331	87.82	151.64
May	111	111,123	5,419,262	97.64	148.70
April	113	120,641	6,406,764	106.33	142.85
March	114	133,738	8,173,095	122.18	155.90
February	116	143,228	9,274,639	129.70	147.02
January	103	106,676	8,011,217	150.16	141.68
Averages:					
1921 (11 months)	113	116,498	$5,895,238	$100.68	.....
1920	105	172,318	13,015,883	151.06	.....
1919	105	154,244	9,989,098	128.22	.....
1918	97	180,859	10,734,114	118.74	.....
1917	97	180,088	8,327,492	92.49	.....

Wage Advances Over 1914, at Peak in 1920, and at Present



the average monthly wage paid in industry, as reported by the bureau of labor statistics was $77.40, compared with $151.06, the average for the year 1920. This represented a reduction of 48.7 per cent. But in October the average advanced to $81.80, a reduction of 45.8 per cent from the general level of 1920. And in November, the wage went up to $92.68, representing a reduction of only 38.6 per cent from the average of 1920. The figure of $92.68, however, compared with $158.72 for November, 1920 represented a reduction of 41.6 per cent.

Common labor in the steel industry is down from 50.6 cents to 25 to 30 cents an hour, a reduction of approximately 40 to 50 per cent. These and other figures in detail bear out the assertion made recently by John A. Topping, chairman of the board of the Republic Iron & Steel Co. that the industry has reduced the average of wages 40 per cent or more.

The bureau of labor statistics are based on figures obtained from a varying number of companies, the total in 1917 and 1918 being 97 companies, while in subsequent years more than 100 companies have been represented each month. The figures show that the average monthly wage paid in the iron and steel industry for the 11 months, to Dec. 1, 1920, was $100.68, as compared with the average of $151.06 in the entire year of 1920. The former figure was greatly increased by the wages paid in the first four months of 1921. In January, 1921 the wage was still as high as $150.16, but by May it had dropped to $97.64. By September it had been reduced to $77.40, while in October and November, as already explained, it advanced. This was due to the taking back of some of the higher-priced labor.

The total wage outlay of 113 plants for the 11 months to Dec. 1 in the iron and steel industry, the bureau's figures indicate, was $11,790,476. This compares with a total of $26,031,766 for the full year of 1920 for 105 plants.

The average number of employes per plant in 1920 was 1641, while the average in the 11 months to Dec. 1, 1921

Index of Union Wage Rates and Hours

(1913 = 100)

	Rates of wages per hour	Full-time hours per week	Rates of wages per week, full time
1907.....	90	103	92
1908.....	91	102	93
1909.....	92	102	93
1910.....	94	101	95
1911.....	96	101	96
1912.....	98	100	98
1913.....	100	100	100
1914.....	102	100	102
1915.....	103	99	102
1916.....	107	99	106
1917.....	114	98	112
1918.....	133	97	130
1919.....	155	93	148
1920.....	199	94	189
1921.....	205	94	193

The foregoing figures are as of May each year, as compiled by the bureau of labor statistics. A general estimate of the index of all union wage rates was submitted to the President's conference on unemployment as of August, 1921. The figure was 189, indicating a reversion of the rates to below those of May, 1920.

Wage Changes Based on Selling Prices

Amalgamated Association of Iron, Steel and Tin Workers' Scale

	Percentage advance at peak over 1914	Percentage advance in Nov.-Dec., 1921 over 1914	Percentage reduction from peak of 1920
Sheet mill workers	109.5	18.	43.7
Tin mill workers	96.5	30.	34.
Bar mill workers:			
Puddling	235.	50.	38.
Cinder bottom:			
Heavy scrap.	271.	61.	36.
Light scrap..	253.	57.	35.5
Cast swarth.	250.	57.	35.
Sand bottom:			
Heavy scrap.	212.	48.	38.
Light scrap..	271.	61.	36.
Muck rolling...	227.	50.	49.5
Piling on boards	138.	31.	42.
Heating	174.	34.5	30.
Guide mill.....	137.	32.5	44.
Average, bar mill	216.8	47.9	51.6

was 1031, a reduction of 37.1 per cent. The average number per plant engaged in November, 1921 was 1052. The total number employed in 118 plants in November was 124,147.

The consensus of opinion in industrial enterprises generally is that unions are less of a factor today in determining wages and working regulations than at any time in the past eight years.

A general estimate of all union wage scales was obtained by the President's conference on unemployment placing the index number as of August at 189, compared with 1913 as the base, or 100. The rapid rise in wages did not begin until 1914 when the world war led to increased demand for men in American industrial enterprises.

The only department in the iron and steel industry, generally speaking, in which employers deal with trades unions is in the independent sheet, tin and iron mills, through the Amalgamated Association of Iron, Steel and Tin Workers. As wages paid the union mill workers are based on selling prices it is interesting to note how they compared with the general average of union labor.

As previously shown, sheet mill workers' wages in December were 18 per cent over the 1914 level; tin mill workers, 30 per cent, and iron mill workers, 47.9 per cent. This indicates that in a declining market such as experienced during the past year in the iron and steel industry, wage reductions based on selling prices recede much more rapidly than do the general averages of union wage rates. At the peak in May, 1921, the average hourly rate paid union workmen was 205 per cent above 1913. Sheet mill workers at the peak were 109.5 per cent above 1914; tin mill workers, 96.5 per cent, and iron mill workers, 216.8 per cent.

In the case of sheet and tin mill workers, under the selling price-wage agreement, the advance was not so great as the average of trade unions. A striking exception is the fact that the rise in iron mill workers' wages at the peak exceeded the general average of union labor.

The wages of sheet mill workers under the Amalgamated scale have been reduced 43.7 per cent from the peak; those of tin mill workers, 34 per cent, and those of iron mill workers, 51.6 per cent.

By way of comparison with some other basic industries of the country: The average of wages paid railroad employes of all classifications is 125 per cent above that of 1914. The peak figure was 153 per cent above 1914. The present high average indicates why executives insist on further action.

Building labor, principally unionized, also shows a high average above 1920, considering the widespread idleness. It still is 90 per cent above the prewar rate. Its peak figure was 120 per cent above 1914. Union coal miners have succeeded in keeping up their wages to a average of 73 per cent above 1914, while that for nonunion miners is only 36 per cent.

As more employers are beginning to base wages on costs of living, a comparison with the latter figures for December serves to indicate the position of the various classes of labor. The general average of living costs was 62.7 per cent above the level of July, 1914. It will be seen from this that in their relationship to the cost of living, wages show a wide variation. Union labor, especially railroad and building contract employes, are far above the line of living cost, while the rank and file of nonunion labor is below it. This discrepancy can be traced in a large measure to the fact that union labor has succeeded in keeping up its wages; therefore keeping up the cost of living for nonunion employes. This especially is indicated in the case of railroad workers, as transportation rates effect commodities of all kinds; and in building contract labor, which keeps up the cost of shelter. This item alone in December was 69 per cent above that of July, 1914.

The employes in the iron and steel industry have made a fair share of the sacrifices necessary for the reestablishment of business on a sound basis. Wage reductions in the industry have slowed up perceptibly, and have become less frequent.

As a result of the President's conference on unemployment, the number of idle workmen in the country has been reduced from 3,000,000 to less than 2,000,000, despite seasonal stoppage in some occupations. With the situation improving in this respect; with the public's attention focused on those few factors which still are militating against favorable operations of industrial plants and the prosperity of the country in general, 1922 seems destined to witness important changes, laying the foundation for steady improvement.

Rise and Fall of Union Molders' Wages

	Rate prior to war, 1914	Highest rates since 1914	Present minimum rate and hours
BOSTON:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$6.00 for 8 hours 93.2% over prewar
CHICAGO:	$4.00 for 9 hours	$8.40 for 8 hours 136.4% over prewar	$6.40 for 8 hours 80.1% over prewar
CINCINNATI:	$3.50 for 9 hours	$7.00 for 8 hours 125.5% over prewar	$6.00 for 8 hours 93.2% over prewar
DETROIT:	$3.50 for 9 hours	$8.50 for 8 hours 173.7% over prewar	$7.20 for 8 hours 131.9% over prewar
MINNEAPOLIS:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$6.00 for 8 hours 93.2% over prewar
NEW ORLEANS:	$3.25 for 9 hours	$7.20 for 8 hours 149.3% over prewar	$6.40 for 8 hours 121.6% over prewar
NEW YORK CITY:	$3.75 for 9 hours	$7.04 for 8 hours 111.5% over prewar	$6.50 for 8 hours 95.6% over prewar
PITTSBURGH:	$4.00 for 9 hours	$7.50 for 8 hours 111% over prewar	$6.25 for 8 hours 75.9% over prewar
ST. LOUIS:	$3.50 for 9 hours	$8.00 for 8 hours 157.7% over prewar	$6.80 for 8 hours 119% over prewar
CLEVELAND:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$6.00 for 8 hours 93.2% over prewar
INDIANAPOLIS:	$3.50 for 9 hours	$7.20 for 8 hours 131.9% over prewar	$6.00 for 8 hours 93.2% over prewar

The foregoing schedules are for floor, bench and core workers, with two exceptions: Coremakers in Minneapolis prior to the war received $3.15 for 9 hours, and coremakers in Indianapolis, $3.30 for 9 hours. In later comparisons they are on the same basis as floor and bench workers in their respective cities.

Machine Shop Wage Comparisons

	Average hourly rate, February, 1915	Average hourly rate at peak, 1920	Present hiring rate
Toolmakers	$0.40	$0.79	$0.61
Machinists	.35	.72	.50
Lathe hands, under 24-inch	.32½	.65	.45
Lathe hands, over 24-inch	.37½	.61	.50
Planer hands, under 36-inch	.30	.72	.45
Planer hands, larger	.35	.70½	.50
Grinders, rough	.25	.50	.30
Scrapers	.30	.69	.50
Floor hands	.35	.65	.50
Bench hands	.30	.62	.35
Drill press, ordinary	.25	.54	.30
Drill press, radial	.30	.59	.35
Boring mill	.37½	.72	.55
Screw machine, hand	.25	.55½	.35
Screw machine, automatic	.30	.65	.40
Turret lathe	.32½	.65	.40
Milling machine, hand	.25	.56	.40
Milling, plain	.27½	.63	.45
Milling, universal	.30	.58	.50
Blacksmiths, forgemen	.30	.70	.50
Blacksmiths, hammermen	.30	.71	.50
Patternmakers, wood	.35	.92	.70
Helpers	.25	.54	.30
Polishers	.30	.60	.45
General labor	.20	.43	.30

The foregoing averages while taken from the statistics in the Cleveland district are fairly representative of the averages in the largest districts of the country represented in the National Metal Trades association. The comparison is given to indicate the changes in wages applied to the more important classifications. The maximum and minimum hiring rates at present are 20 per cent above to 20 per cent below the average.

GETTING BACK TO BUSINESS IN THE MACHINE TOOL INDUSTRY

By Oscar E. Perrigo

SINCE the publication of my article a year ago, reviewing the improvements in machine tools in 1920, many important changes have occurred. The industry has entered and is passing through a period of depression which is taxing the courage and resourcefulness of even the most experienced manufacturers. It is to the lasting credit of machine tool builders that they are meeting the situation nobly and are striving to keep their organizations intact, so as to be prepared when normal business conditions return. They have shown their faith in the future by continuing to improve their product and to create new designs so that when active demand is resumed, a better line of machine tools can be offered.

The opinions expressed in the review of 1920 seemingly are being carried out in the practice of 1921. The tendency to drive machines with individual motors is more pronounced; motors more frequently are being placed in the bases of new machines; the increase in the number of designs for automatic machines continues unabated; and the desire for greater accuracy is more insistent than ever. Although a few large automatics were developed in 1920, there is a tendency toward units of even greater dimensions. The continued desire for higher speeds also is manifested in some of the new designs. Single purpose machines are holding the high favor gained in recent years and are likely to win new adherents as time goes on.

A considerable increase of interest in grinding machines is reflected by the many new designs developed during the year. The use of abrasive machinery doubtless will expand because manufacturers are beginning to realize the opportunities offered by grinding processes.

In reviewing the developments in machine tool design for the year the author has not attempted to present all newly designed machines, as they already have been described during the year in THE IRON TRADE REVIEW. The purpose of the article is to point out the trend in design by referring to typical machines which have been brought out in the past 12 months and to call attention to their significant features.

Of the many radical changes in design attempted in 1920, perhaps the most striking is embodied in the inclined lathe shown in Fig. 1. In fact, were it not for the familiar heads of an "automatic", the machine hardly would be recognized as a lathe. However, upon examination, we find many things to admire in it.

Any man who is familiar with the operation of an automatic screw machine with horizontal spindles knows that at times it is awkward to get at some of them. In this lathe the whole mechanism is tilted up at a sufficient angle to make most of its moving parts readily accessible. The working part of the machine is raised on a base with an inclined top, thus forming spaces beneath for the motor, which is protected from dust and the danger of foreign articles dropping upon it. The inclined base also contains receptacles for gearing and a compartment for cutting compound. Instead of the cam drum being at the lower part of the ma-

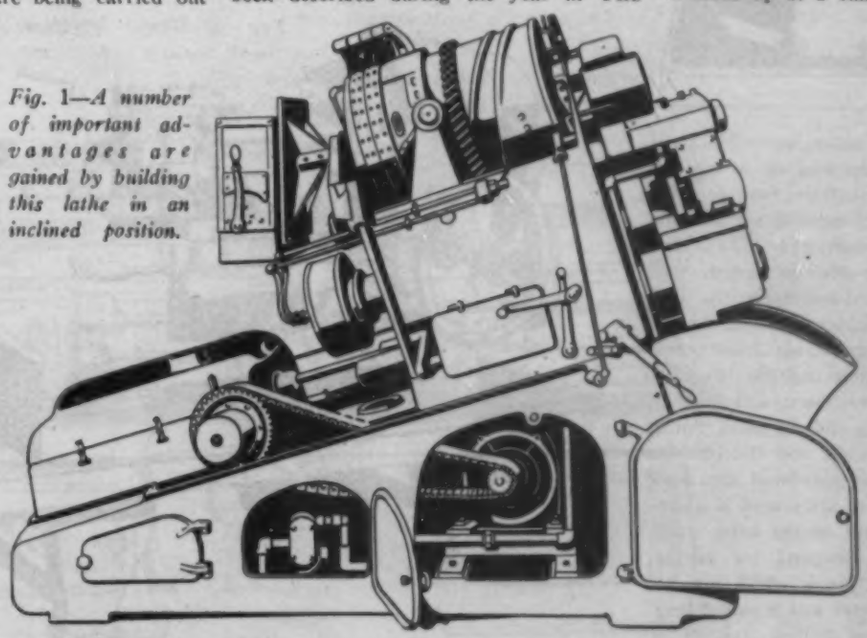


Fig. 1—A number of important advantages are gained by building this lathe in an inclined position.

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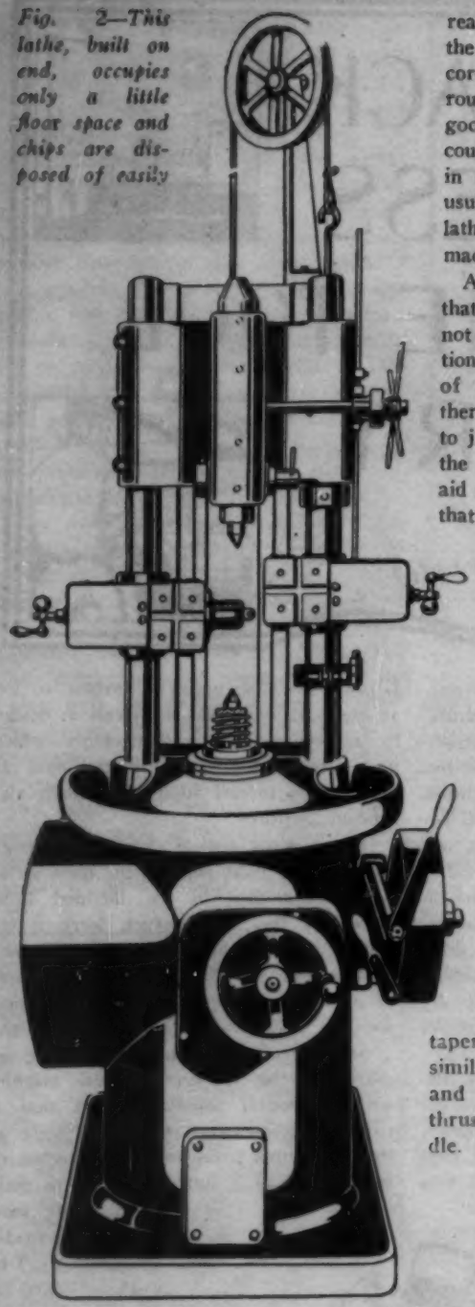


Fig. 2—This lathe, built on end, occupies only a little floor space and chips are disposed of easily

reaming, but its real field is said to be the machining of castings which have cored holes and forgings which have rough drilled holes. The machine is a good example of compactness of design coupled with convenience in handling, and in a general way it entirely ignores the usully accepted idea that because it is a lathe it must be a horizontal type of machine.

Another notable example of the fact that because a machine is a lathe it need not necessarily be in a horizontal position, is shown in Fig. 2. A vertical lathe of this type conserves floor space, but there are other reasons quite as important to justify its novel design. The fact that the machine stands on end is a material aid in the disposal of chips. It is claimed that it is operated more rapidly than a horizontal lathe. The cooling solution for the tools is more readily applied and more conveniently brought back for continued use. It will be noted that the bed and the supporting column are cast in one piece, and the coring out of this casting provides a reservoir for the cooling liquid, which is caught in a large circular pan and returned to the reservoir. There are two tool carriages, one at each side of the vertical bed, which are similar to the tool slides on a turret lathe. The head spindle is driven from within the supporting column of the machine, as is also the feeding mechanism. The head spindle is mounted in tapered, adjustable bronze bearings similar to those in a milling machine, and with a ball bearing to take the thrust and weight of the vertical spindle. Near the center of the head spindle is a bevel gear deriving its motion from other gears in the rear.

The tool carriages are clamped to vertical sliding cylindrical bars and the feed of the tool is accomplished by sliding these bars downward, by a rack and pinion device, the rack teeth being cut on the sliding bar and engaging those on the pinion, located in the rear. The gears for the feeding device are located in a compartment formed in the bed. These are analogous to the change gears on an ordinary lathe and serve the same purpose as far as feeding is concerned, so that the speed may be varied as needed. These gears are located in a gear compartment under the pan.

While the machine is of unusual design its record seems to show that it is an exceedingly practical tool.

While automatic lathes are not new the one shown in Fig. 3 possesses a number of interesting features not heretofore noted in this class of machines. One of them is the arrangement for the use of multiple tools, by which a considerab'e variety of operations can be performed simultaneously. As the strain on the supporting parts is considerable, the lathe is built on the lines of a 22-inch machine. Only three changes of speed are provided, since the tool is primarily a manufacturing lathe. The main drive is by helical gears, which by their long tooth contact give a uniform and steady pull for the cutting action.

To give additional rigidity the headstock is cast in one piece with the bed. The positive geared feed is driven directly from the spindle, through

chine, it is placed in an accessible position to facilitate the making of adjustments. The drum carries four separate cams—two on its cylindrical surface and one face cam on each end. The cylindrical cams provide for the length feed motion of the tool slides, while the face cams give the cross-feed motion to the tool slide. The upper or front cams control the upper slide and the lower or rear cams control the lower slide.

The driving pulley and the main clutch, together with the gears and clutches for obtaining the various speeds of the work spindle and cam drive are placed in a separate case at the rear of the lathe.

The machine is designed for boring, turning and facing pieces which are not over 12 inches diameter and 6 inches long. It is not adapted for drilling, tapping or

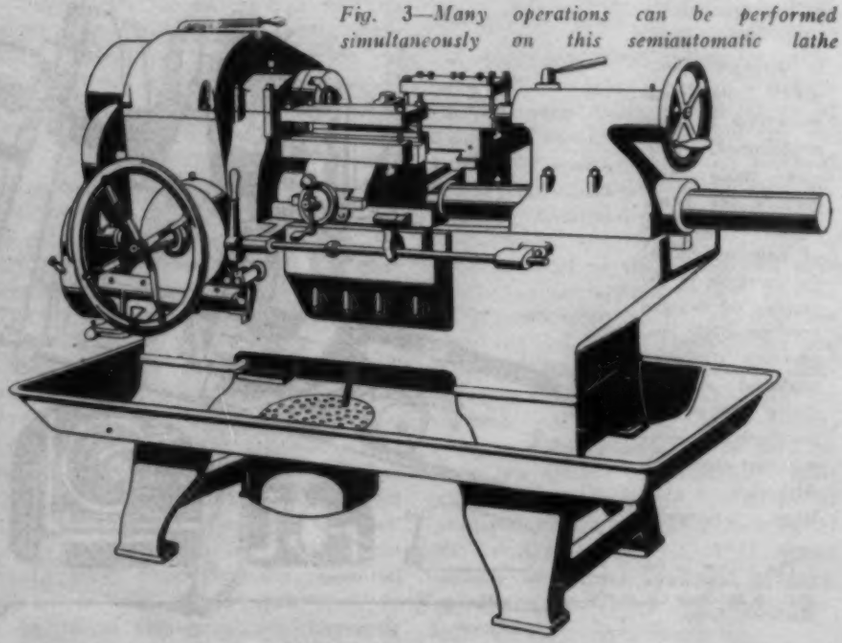


Fig. 3—Many operations can be performed simultaneously on this semiautomatic lathe

a series of spur gears, two of which are slip gears, by which a sufficient variety of feed changes are produced.

The power feed for the facing head is derived from a cam drum driven from the cross spindle by a rack and pinion, by which both the turning and facing heads are controlled by the same stop. As these cuts are made simultaneously the time for completing the series of operations is limited to the time required to make the longest cut.

The two tool blocks are arranged for several tools and it is possible to have different feeds on the facing head from those on the turning head. The lathe will swing 14 inches and take in 18 inches between centers. While this is not strictly an automatic lathe in the sense of taking work from a magazine, turning it and dropping it out, it is a machine capable of doing a large number of complicated operations at a very rapid rate.

The geared head lathe now appears to be the coming machine where ease and convenience of operation is concerned and where ample power is essential. Several designs of this character have been developed and the prospect is good for more in the near future.

In general the one shown in Fig. 4 is a good representation of the type, although in a few details there seems to be an opportunity for improvement. Eight spindle speeds are provided and the levers for making the desired changes of speed are conveniently located. That for starting and stopping the lathe is at the right hand of the apron. The fact that by bringing any one of these levers to a neutral position will stop the rotation of the spindle, is a good point, as is also the device for locking the spindle when changing chucks, face plates, etc. The clutch starting levers are locked when the device for locking the spindle is in an operative position. Ball bearings in the drive pulley and for the end thrust protect these important parts for excessive friction. The quick change gearing is provided by the usual cone of gears, 11 in number. The change gear box at the left makes four changes, therefore the total number of changes is 44. Provision is made for cutting nine metric threads with the rocker level, making 36 in all. A geared pump located in the headstock insures continuous circulation of lubricant without the danger of a long and narrow belt being accidentally thrown off.

This lathe is driven by a motor placed where it really belongs, that is, in the front cabinet, where it is out of the way, is protected from dust and dirt, and yet is easily accessible for tightening the belt, or for adjusting the motor.

There are several distinct advantages in the present design. The spindle speeds are obtained through the use of internal expanding clutches, whereby the spur gears remain engaged their entire width and depth of teeth. Another is a device for locking the spindle when face plates, chucks, etc. are put on or taken off. The lathe shows ample evidence of much careful thought in arriving at the present design.

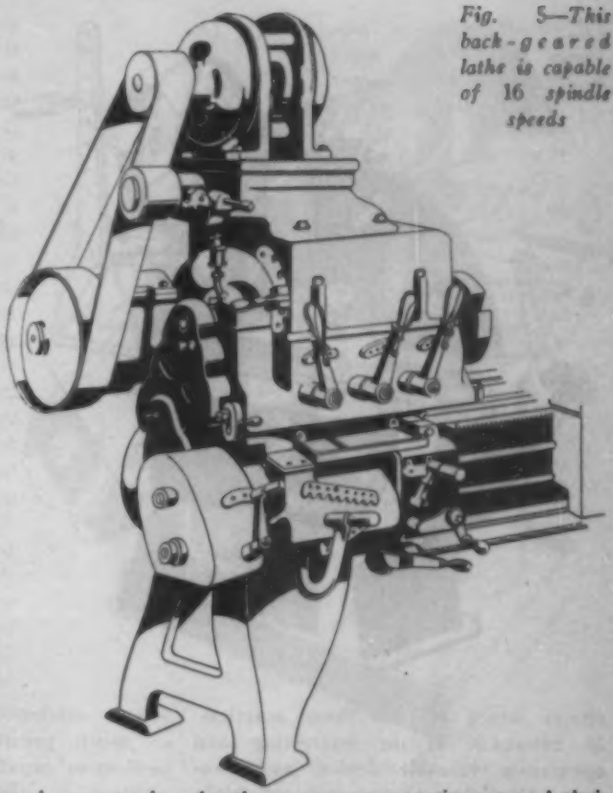
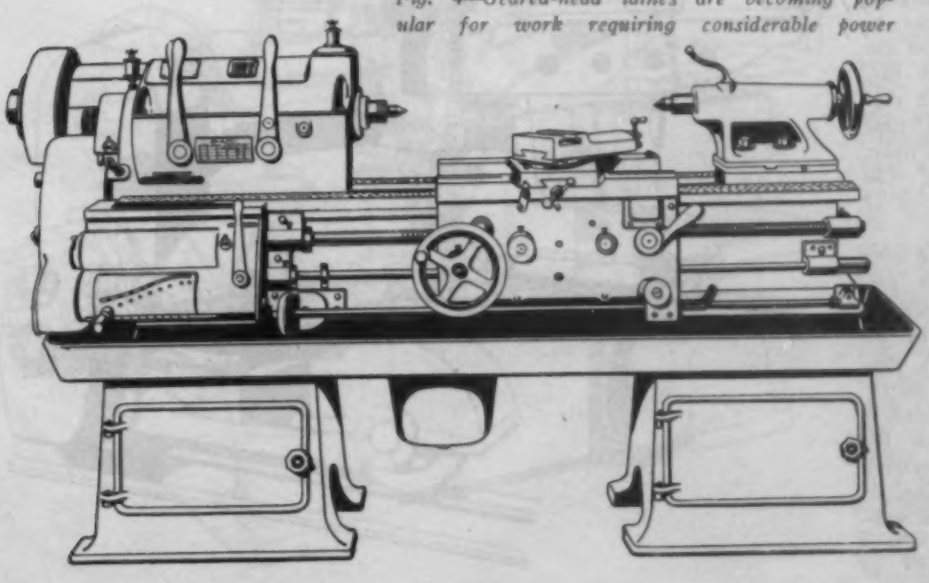


Fig. 5—This back-geared lathe is capable of 16 spindle speeds

Geared head lathes still seem to be the favorites and it is probable that in a comparatively short time only the smaller, cheaper and more common grade of lathes will be built with cone heads. Although having a geared head, the lathe shown in Fig. 5, is capable of 16 spindle speeds, all made available by shifting levers in the gear box. The driving gear ratio is 57 to 1. If a motor is used for direct drive, it is to be regretted that it must be placed on top of the headstock, as it would seem to detract from the symmetry of the lathe and to increase whatever vibration there might be with a motor running at 1800 revolutions per minute and with a short, rapidly traveling belt and a tightener. The quick change mechanism is with the familiar "cone of gears" arrangement but with the advantage of two central driving gears whereby the series of ordinary changes is much more readily accomplished, as they are made with one lever only. An attachment for hand screw ma-

Fig. 4—Geared-head lathes are becoming popular for work requiring considerable power



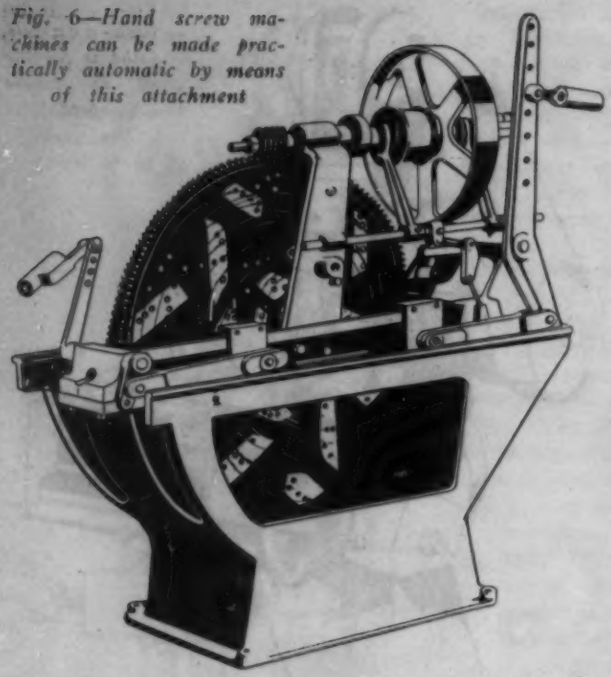


Fig. 6—Hand screw machines can be made practically automatic by means of this attachment

chines which renders them practically automatic is an interesting and apparently valuable device, as it reduces the labor of the operator while it considerably increases the production of the machine, which is a matter of vital importance at the present time and undoubtedly will be for some years to come.

The device consists of an enclosed frame which may be placed at either the head or the turret end of the machine and attached to the operating levers by means of certain rods and brackets. Inside the frame, as shown in Fig. 6, is a disk upon which are flat cams actuating crossheads by means of contact with rollers. The crossheads operate the so-called reach rods. With the use of these attachments it is asserted that one man can operate from one to as many as five machines. The machine can be started, reversed and stopped, and the back gears thrown in or out, the turret indexed and the forming and cutting-off tools controlled at any time and in the usual manner of the operation of the automatic machine. The stock may be moved a distance of 12 inches.

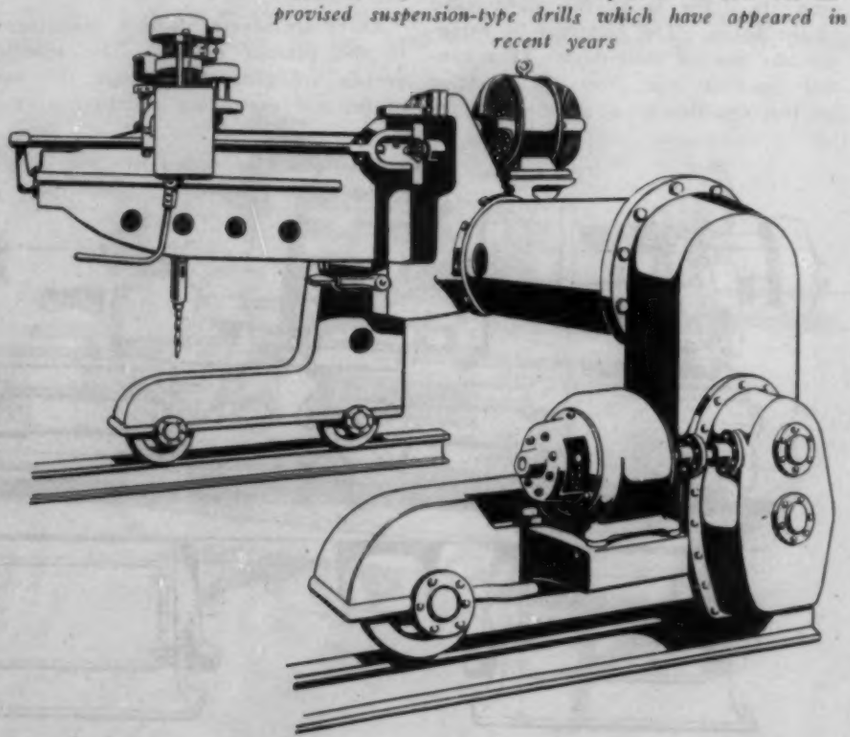
These attachments are furnished with 20 cams, which are ample for any ordinary job, so that one piece of work is completed each time the index completes a revolution. A special countershaft regulates the movement of the material and the speed is governed by buttons located on the ring gear. Should the parts passing through tend to clog the machine, or cause the belts to slip there is a safety pin to correct the difficulty. Another convenient device is that of a hand crank by which the operator may turn the machine and so ascertain if the tools are properly set to make a correct piece of work. Still another valuable feature is that one attachment may be arranged to operate two machines on the same piece of work, since it makes no difference at which end of the machine the attachment is placed. The practical value of any device possessing such a number of practical features and of such varied adaptability and usefulness is quite apparent, and since we can transform the older style of hand screw machines into machines of so much greater value as to their productive capacity, it is an important addition to the machines' equipment at a nominal outlay.

As stated in last year's review, multiple spindle drills are being recognized as valuable tools for certain kinds of work. While many of these machines have their spindles arranged in a flexible manner, so that they may be adjusted to varying positions a large number of them are built with their spindles in fixed positions to accommodate the particular piece of work to be drilled or tapped. A machines of this type, developed during the year, carries 16 spindles. This number can be greatly exceeded to suit conditions. The driving gears and the feed gears are contained in separate compartments.

The jig or fixtures are located on a traveling table which may be moved forward and back, or may be arranged to move from right to left and vice versa if necessary. For instance, with two rows of spindles, holes may be drilled with one row and the table shifted to the other and countersinking may be done. Or, drilling and tapping may be accomplished in a similar manner.

In recent years several types of overhead suspension drills have been developed for use on large castings where it is much more convenient to move the drill than the work. The so-called "railroad drill," moving on a track used in drilling long lathe beds, is another example of the portable drill. However, these should be classed as special machines rather than standard tools built for the market. The so-called gantry drill, shown in Fig. 7, is a decided improvement over the improvised suspension type of drill. It is mounted on a floor track the width and length of which is adapted to the uses to which it is to be put. It is driven by its own motor, which may be so connected as to move it to any point within the area

Fig. 7—The gantry drill is an improvement over the improvised suspension-type drills which have appeared in recent years



of its scope. There is a drilling head mounted on the radial arm, which swings upon its support on the cross beam. Or, if the span is much increased two or more radial arms may be conveniently mounted, thus materially increasing the capacity. Additional drilling heads may be added to each arm if required and one or more motors may be used. The machine is adapted to drilling, tapping, counterboring, spot facing, milling, and similar operations upon large castings which may be moved to a point within its range. It is easy to conceive of many operations where such a machine would prove invluable, and its design seems to mark it as a new departure in the line of drilling machines.

In the article published last January reference was made to the new design of a helical fluted cutter. It has proved a most satisfactory "formed" cutter; but to properly keep it in an accurate condition to do the fine work for which it was intended there has been developed a new design of cutting grinder. Not only the "formed" cutters having helical flutes, but any helically fluted cutters may be ground on this machine in a more perfect manner than heretofore has been possible. In order to properly grind the helical flutes of cutters this machine was designed so as to impart a combined traverse and rotary movement to the cutter. The table on which the cutter is mounted can be swiveled horizontally about an axis which intersects the axis of the spindle and the grinding wheel. Therefore this table must be swivelled at the same helix as that of the cutter teeth. It then is reciprocated in the usual way by means of a handle operating a rack and pinion. At the same time a reciprocal rotary movement is imparted to the cutter through a set of change gears selected to conform to the lead of the teeth of the cutter. There are two special features which insure a high degree of precision for grinding spiral teeth milling cutters. First, an indexing device which successively brings the teeth in line for grinding instead of providing a spring stop against the back of the teeth. The second feature is distinctive as well as novel. Cutters of varying sizes can be ground radially, that is, on a line passing through their exact center, without the necessity of resetting either the head or the table. Provision is made for always keeping the grinding wheel in correct form by means of an accurately adjustable diamond holder. Thus the grinding wheel is always maintained at a true cone angle. As might be expected, this machine is of excellent design and workmanship since it must perform in a really scientific manner to produce the proper results.

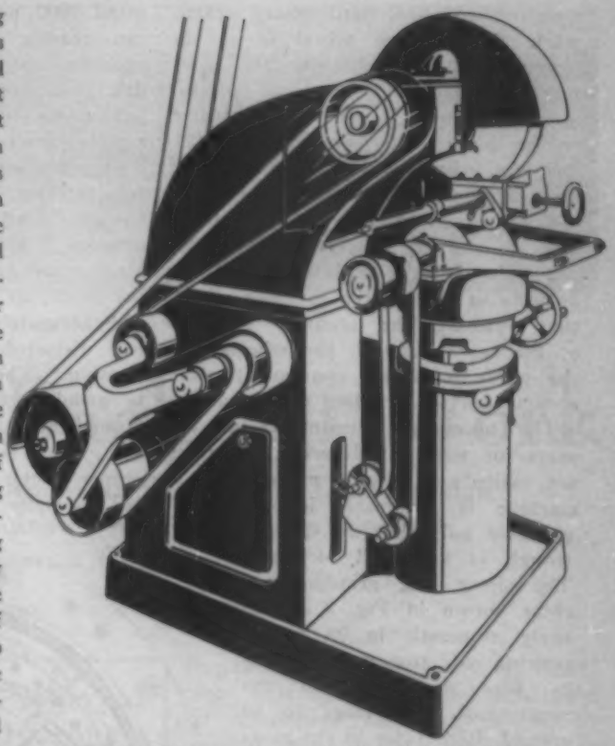
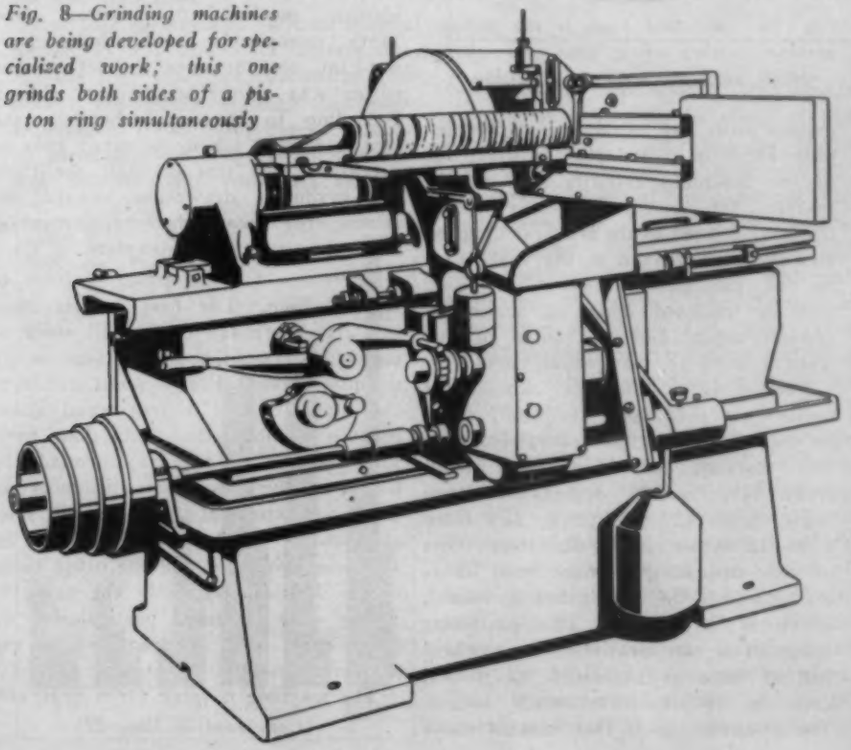


Fig. 9—This machine embodies the principle of centerless grinding, but reflects departures from the original design

Fig. 8—Grinding machines are being developed for specialized work; this one grinds both sides of a piston ring simultaneously



At one time it was thought that centerless grinding might do for ordinary work, but when it was placed beside work done on centers in grinding machines, it would suffer much by comparison. The fallacy of this belief has been exposed by the work that is being done on properly designed centerless grinders. The writer has a piece of work ground in one of these machines that varies in cylindrical form and in diameter less than 0.0002 inch.

This machine, shown in Fig. 9, has been developed along practical lines. The well known principle of centerless grinding is followed to a considerable extent, but not wholly so. The work is held at three points around its circumference,—the grinding wheel, the feed wheel, and the guide bar. The feed wheel is adjustably inclinable from zero to seven degrees, but is generally held at about four degrees. At this inclination, and by using proper speeds for the wheels, the work will pass through at a rate of about six feet per minute. The machine is of comparatively simple construction, consisting essentially of a grinding wheel, feed wheel and the guide bars, these latter simply holding the work in place between the two wheels. The feed wheel is

composed of fine, hard emery grains, while the grinding wheel is of the ordinary grain suitable for the work to be ground. The pressure of the grinding wheel is carefully adjusted to the depth of the desired cut. The grinding wheel and the feed wheel run counterclockwise, and the piece to be ground in the opposite direction.

The face of the feed wheel is twice as wide as that of the grinding wheel, thus insuring the accurate progress of the work between the wheels and the guide bars and consequently the accuracy of the grinding operations.

The necessary adjustments of the parts for work of differing diameters are easily and quickly made and the machine is automatic in its action provided only that the inclined trough is kept full of work. The piston ring grinding machine shown in Fig. 8, is entirely automatic in its action, reuiring only that the magazine be kept supplied with the rough cast iron rings to be ground. Both sides of the rings are rough ground simultaneously, the finishing operation being completed on a precision grinder, usually with the rings held on a magnetic chuck. However, the roughing operation has much to do with the final grinding because if the rough grinder leaves the rings with any warp or twist, and they are afterwards put on a magneto chuck for finish grinding, they will be drawn down to the flat surface of the chuck and after finish grinding the ring will spring back to its originally warped condition. Therefore, proper grinding is important.

In this machine the ring castings pass across the entire grinding faces of the opposed 18-inch cupped wheels, which are forced together by means of a lever and weights, the pressure being adjusted by adding or removing weights. There is a positive micrometer stop screw located at the front by which means the rough grinding is brought to about .005 inch of the required finish width.

There is a wheel trueing attachment by which the wheels can be rapidly dressed without disturbing the setting. The machine takes rings from 2¾ to 4½ inches in diameter and from one-eighth to one-half inch in thickness. The hopper holds 100 rings at a loading and can readily be extended to hold 200. As a production machine it has a large capacity, particularly so considering the accurate quality of its product. It will grind 9000 per day, and as one man can readily run two machines, the capacity per man is 18,000 rings per day.

The use of heat-treated gears is rapidly increasing, but the difficulty of meeting the demand for accuracy is a serious handicap, since much of the steel used is necessarily not homogeneous. Moreover, various strains are set up during the manufacture of the blank, so that gears properly sized and accurately cut may be more or less distorted in the process of heat treating. Therefore, recourse is had to grinding them. The bore is first ground central with the pitch circle, and from the ground bore as the proper center, the sides of the teeth are carefully ground to insure their proper form and engagement with another similarly ground gear. In using one of the machines recently put on the market for performing this work, the heat treated gears are first chucked and the bore ground in the exact center of the pitch circle. The gear then is mounted upon an accurately ground arbor and the sides of the teeth ground to the proper curve.

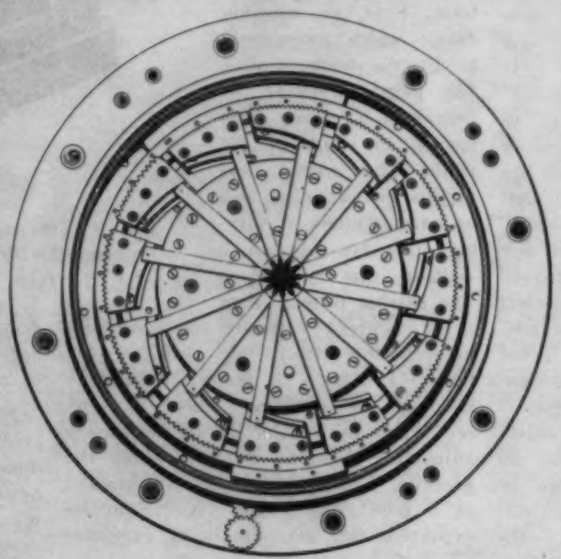


Fig. 10—This tool head is the distinguishing feature of a new gear shaper which cuts all teeth simultaneously

Necessarily a machine capable of performing this work accurately must be well designed and accurately built. The machine will grind gear teeth from 14½ to 24 degrees pressure angle; from 12 to 3 pitch; and from 2 to 12 inches pitch diameter. One of the surprising points about it is the diameter of the grinding wheel, which is 30 inches. The particular value of a comparatively large wheel will at once be perceived, as it will keep in proper form much longer. The disadvantage is that it must make a longer stroke in order to clear the teeth being ground, ready for the next stroke. There is a specially designed diamond holding device by which the true form of the wheel is always maintained.

The wheel is mounted on a stationary column and the work fed past it. The work slide has not only a reciprocating, but a rotary motion which is produced by a segment and steel tapes which can be adjusted to any required tooth form. The accuracy of the indexing feature is a matter of first consideration, and this part of the design seems to have been carefully worked out. Great rigidity and the greatest possible freedom from vibration is another important feature in a machine of this kind, and this requirement has been well taken care of. During the year a number of machines representing distinct departures from conventional ideas have been developed. One of the most striking of these is a gear shaper which cuts all teeth simultaneously. The most distinguishing feature of the machine is the special tool-head shown in Fig. 10, consisting of a series of radially disposed tools placed around the circumference of the gear blank to be cut. These tools are rigid and the gear blank reciprocates past them, thus cutting all the teeth, or more properly speaking, making one stroke or cut on each tooth at the same time, instead of the former method of cutting one tooth completely and then moving on to the next, whether the cutter was a circular one or shaped according to the space between the two teeth and taking as many cuts as necessary. In this case all the tools are gradually drawn in toward the center, the gear blank reciprocating until the cutting is complete.

There are two important features in this machine. The first is that since the gear teeth are cut on all sides of the blank simultaneously, there is no unequal strain at any point to force the blank out of a true axial alignment. Second, the fact that tools are working all the way around the blank at the same time produces an even and constant heat on all sides so that the blank is not distorted by one side being hot and the other being cold. This is frequently the cause of faulty gear cutting, particularly on large gears that are required to run in close contact.

The machine is large for a gear cut-

(*Concluded on Page 27*)

In foreign harbors such as this the world over American steel finds its way

World Is Going Back To Work

Trend of Iron and Steel Exports Indicates American Dependence Upon Foreign Prosperity for Some Business Opportunities—Warehouses Are Empty—Orient Is Buying—South America Getting Ready

BY V. G. IDEN

STATISTICALLY it is proved that the exports of American iron and steel have "turned the corner." They started upward last August, ever since which there has been a steady and constant increase in the business. As production reaches out into the foreign markets of the world it might be supposed the increases and decreases in America's trade would be in inverse ratio to the exportation of similar products from other centers of production. This actually is not the case. The improvement in American foreign trade has been proved to be coincident with the improvement in the exportation of British iron and steel.

But just as England suffered a rapid decline in iron and steel exports during the past year, the continental producers are going through the same experience now. Improvement must be general when recovery is complete and therefore the American exporter can look to the future with more equanimity now than he could at this time last year. Last year the world was going through its industrial depression. Political obstructions to trade were the rule in every country of the globe. International credit had been strained to its utmost and was beginning to crack. The depression came first in Japan and from there spread throughout the Orient and then over the whole world. That was the history of 1920.

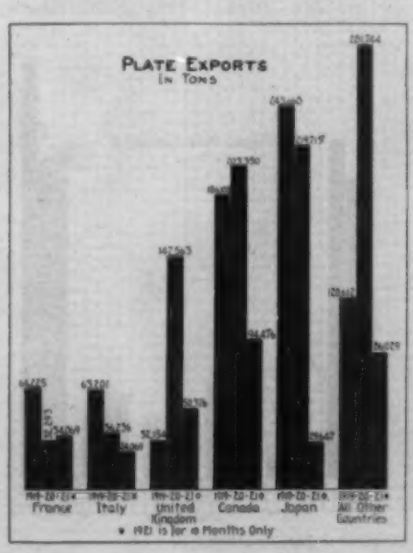
Exports of Principal Products, 1919-1921

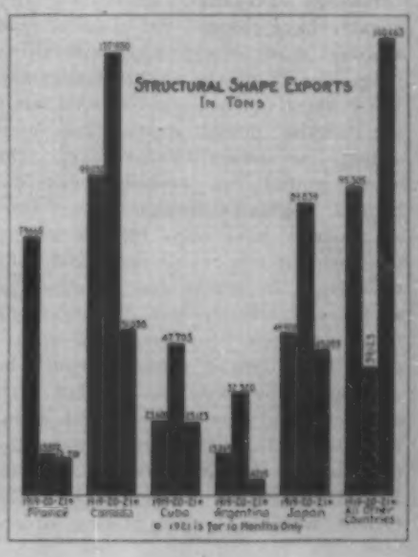
	Gross Tons		
	1921*	1920	1919
Pig iron	24,797	216,828	321,261
Scrap	32,878	219,250	27,275
Ingots, billets, blooms	10,113	216,873	258,424
Wire rods....	15,615	116,767	118,002
Steel bars....	173,683	629,011	554,176
Plates	322,501	920,007	709,968
Sheets	211,123	277,594	279,088
Structural shapes	287,600	493,655	360,787
Tin plate....	98,558	226,395	204,508
Wire	92,648	320,957	291,645
Nails	307,164	594,634	652,443
Pipes and fittings ...	379,378	353,166	273,287
All products..	2,068,468	4,934,087	4,397,295

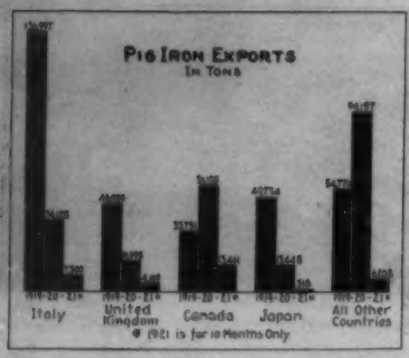
*11 months.

Japan did not recover until the last half of 1921 and its purchases were cautious. But with the beginning of 1921 American exporters were continuing to ship steel on orders which had been placed during the period of feverish purchasing which followed the war. During January 1921 the United States shipped out to foreign markets over 546,000 tons of iron and steel. This tonnage undoubtedly contained much material that was practically forced upon the foreign buyer. However, it is admitted by the department of Commerce that the figures accredited to January actually did not represent the tonnage moved forward. This even was due to the accumulation of ship manifests from earlier months which could not be handled until January. From that time forward the shipments from American ports declined constantly until August when the movement for the month was but slightly over 75,000 tons.

During August the market showed a decided tightening. Until that time prices quoted by American exporters held rather firmly as efforts were being exerted, with the aid of the bankers, to force foreign purchasers to make favorable settlements on old orders. But with the appearance of a prospect for new business it was discovered that American mills were







ready to make some price concessions.

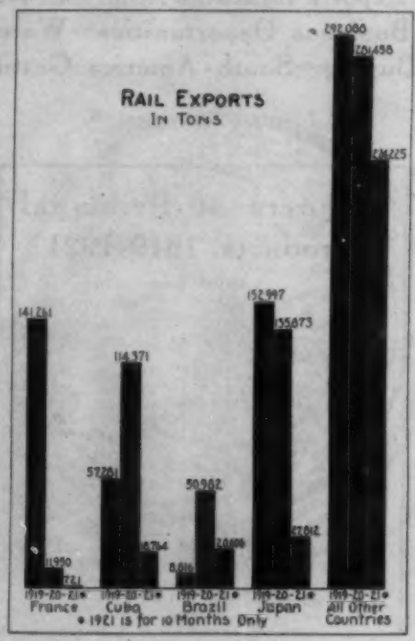
England's foreign trade showed a turn in July. During July, 1921, England exported only 42,468 tons of iron and steel. That increased to 55,058 tons in August. It readily is seen from these figures that the American exports never did go to the extreme low figure of the English. England's exports during the calendar year 1921 will total something in excess of 1,300,000 tons.

When the final official figures for 1921 are tabulated, it will be found that the United States has exported in excess of 2,100,000 tons of iron and steel. This compares with a record of 4,950,000 tons exported in 1920. The 1920 exports established a peace year record. In 1919 the United States exported a little over 4,397,000 tons. In 1918, this country exported 5,338,019 tons of iron and steel but a great part of this was war business. Comparable German statistics are lacking. Much has been heard during the past year regarding the heavy exportation of Belgian steel but it is believed by American dealers that most of this was of German extraction. Continental steel has been quoted f.o.b., Antwerp, and therefore it could be either French, Belgian or German.

Foreign exchange quotations frequently have clouded the situation and at times made it extremely difficult to judge clearly of the export tendencies. But it must not be forgotten that while the English pound sterling has been selling low during the past year, the cheap pound has probably not enhanced England's foreign sales. German marks have been thrown among the cheapest moneys of the world. The depression in marks has resulted in, at times, extremely low quotations on German goods. So cheap did it appear that German products could be purchased by foreign nations that many orders were sent to that country. Japan and China were among the first to look to Germany for supplies. But it was soon discovered that the Orient was no longer placing orders in Germany for railway material. China began to look to the United States for supplies of nails and other articles of general commerce. The last of South America purchases were placed with German mills in August.

Some lesson may be learned from this trend in foreign trading in iron and steel and it now appears to have been established definitely that a cheap money is not a safe index to foreign business. German marks were cheap and that made German products cheap abroad. But when Germany wished to buy raw materials in foreign markets its cheap marks proved a detriment.

Germans, as it has been learned

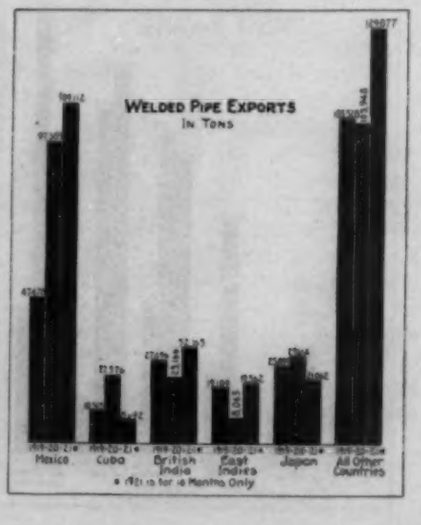


in the past, are careful and shrewd traders. They are beginning to realize that it is not to their profit to permit foreigners to buy their products at bargain prices because marks are selling cheap. They will get the most they can for their products, and that, in a sense, will offset the disadvantage at which they are placed when they make a reparation payment abroad or try to buy raw materials abroad.

Similarly a change in the world's attitude toward Russia is now in the making. The Hoover food relief to the sufferers in the Volga region was only a beginning. To discover that the Russian peasant, the Russian farmer is not in the least disgruntled with the present government in that country may come as a startling revelation to many but it is not so surprising to those American business interests who have been advising for months that their government remove the political obstacles to a restoration of trade relations with Russia. Russia may never purchase much American iron and steel, but once that country is placed on its feet it will be a natural market for continental European iron and steel.

Getting the world back to work is a task to which the American banker is finding himself drawn, and that is a factor in the situation which just now especially is pleasing to the American exporter. Some months ago the American banker practically withdrew his support of the American exporter in the South American market. Probably the banker was not entirely to blame as there have been many traders who have been chiefly interested in the immediate profit. But the American banker counselled the cancellation of contracts and the liquidation of accounts in South America. Some traders are of the opinion that such tactics on the part of the bankers intensified the industrial depression which swept through the South American continent. Ever since the exporter has found it impossible to obtain the necessary accommodation from his banker on a South American export order unless the purchaser had been required to put up an irrevocable letter of credit in New York. It has been the same as requiring payment in advance. Today American bankers are beginning to examine into this condition with a little more care.

During the past year America's exports of pipe and fittings ran largest in tonnage. This was largely due to the demand of the various oil fields of the world. Prospecting, however, was checked later in the year due to the drop in the world demand for oil with a consequent contraction of the needs of supplies. During the last half of the year, however, there developed a lively demand for tin plate of oil can sizes. This came chiefly



from Japan. The Orient also presented a healthy demand for ordinary tin plate before the close of the year.

Among the larger items of export during 1921 were steel plates, although they were less than a third of the amount exported in 1920. On the other hand, the exports of structural iron and steel practically equalled those the year previously. Due to the influx of sheet orders from Japan during the last half of the year, the exports of that material approximated those of the year before. The amount of galvanized sheets and plates exported was little better than half such exports in 1920. Steel bar exports were about one-third.

Exports of cast pipes and fittings were about up to normal if normal is to be measured from 1920. On the other hand exports of steel rails were a little better than half.

Chile has made some car and locomotive purchases in Europe, but the bulk of its needs in this regard have been held over. The same is true of most of the railroad projects in South America. Argentina, however, did give the United States the only railway material order of importance that country let during the past year. In the Orient the railway needs are tremendous but they have not as yet been met on account of unsettled political conditions which exist throughout.

Exports and Imports of Iron and Steel

Gross tons

Year	Exports	Imports	Balance of trade
1921*....	3,068,468	97,873	1,970,595
1920.....	4,934,087	421,274	4,512,813
1919.....	4,397,295	322,264	4,075,031
1918.....	5,338,019	169,110	5,168,909
1917.....	6,465,053	330,201	6,134,852
1916.....	6,110,732	328,965	5,780,531
1915.....	3,532,364	282,396	3,250,168
1914.....	1,549,554	289,775	1,259,779
1913.....	2,745,635	317,260	2,428,375
1912.....	2,947,596	225,072	2,722,524
1911.....	2,187,725	262,457	1,925,268
1910.....	1,537,943	510,730	1,027,213
1909.....	1,243,583	363,984	879,599
1908.....	964,242	205,845	758,397
1907.....	1,301,981	662,358	639,623
1906.....	1,325,740	577,809	747,931
1905.....	1,010,255	416,000	594,255
1904.....	1,167,674	266,398	901,276
1903.....	326 590	1,178,797	852,207
1902.....	411,915	1,212,484	800,569
1901.....	81,211	221,297	140,086
1900.....	286,687	209,955	76,732

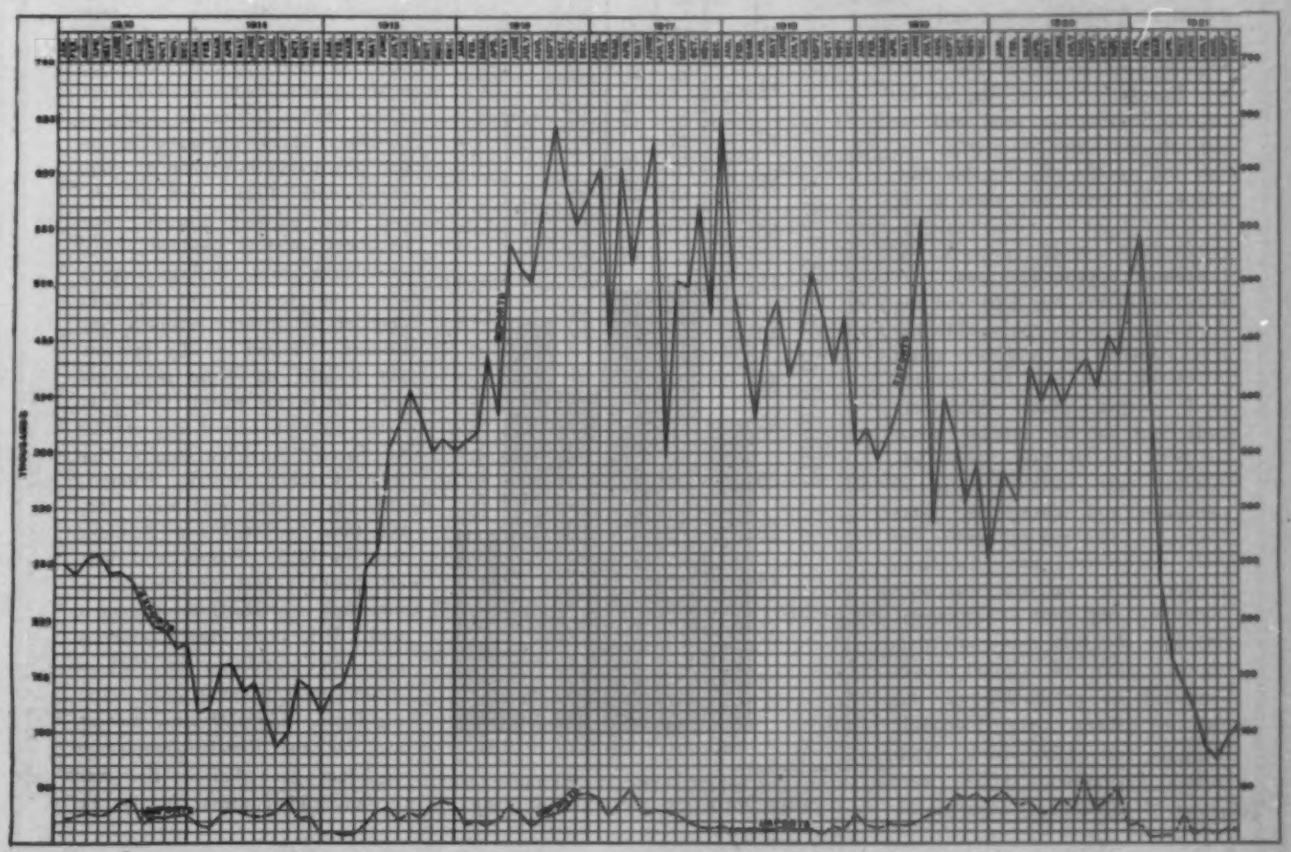
*11 months.

Due to the continued slump in South America and the failure of Argentina to recapture markets for her agricultural products, American exports of wire products in the past year showed a marked decline. Exports of plain wire were about 50 per cent of the total in 1920 while exports of barbed wire were about one-fourth. With a restoration of the markets for agricultural and mineral products of South America, however, it is expected a much livelier demand for American wire will develop. The fact that the exports of nails did not exceed by half the nail exports in 1920, however, was due to the low prices quoted in the Orient by German producers.

The greatest loss, so far as percentages are concerned, was in crude materials, the exports of which fell off to little or nothing during 1921. As an example, the exports of billets, etc., during 1920 were 25 times as large as they were in 1921; the exports of scrap were six times as large, and the exports of pig iron were eight times larger than during the calendar year just past.

For the future much more favorable prospects can be offered than was the case this time last year. Last year Japan was holding in storage a surplus of some 300,000 tons of steel when her normal rate of consumption was 20,000 tons a month. Similarly South America was overstocked and exportations of renewed trade were contingent upon the time when consumption would relieve the the congested warehouses. Today the situation is reversed. The warehouses are depleted, and, while demand has not as yet reached normal proportions the underlying demand is there.

American business has every reason to feel optimistic over the export prospects.



FLUCTUATIONS MONTH BY MONTH OF BOTH IMPORTS AND EXPORTS ARE SHOWN HERE

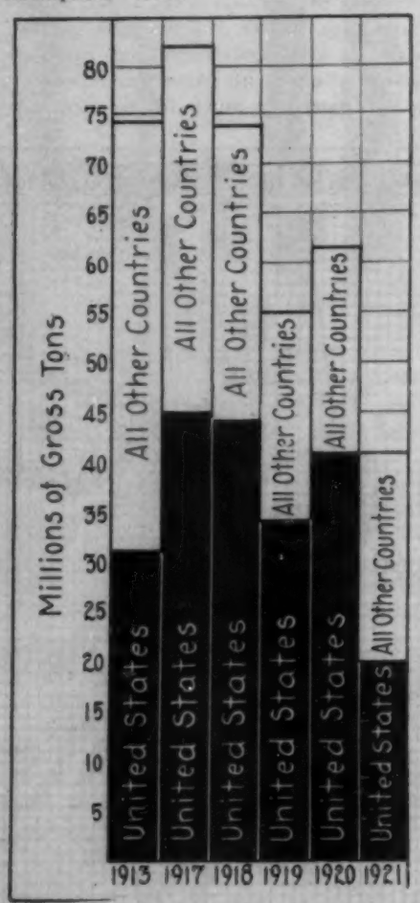
World's Output at Lowest Ebb

Careful Estimates Show Iron and Steel Production Was About Half Capacity Last Year—Germany and Central Europe Gain—France Holds Her Own—America, Britain and Belgium Slump

PERHAPS never again will the world's iron and steel production sink to the level of 1921. According to statistics compiled by THE IRON TRADE REVIEW with the assistance of its corps of staff correspondents in Europe and the Far East, the world's output of pig iron last year was 35,810,000 gross tons and the production of steel ingots was 40,731,000 gross tons. These figures compare with 60,635,400 tons of pig iron and 68,321,000 tons of ingots in 1920. Nearly ten years ago, before the war, in 1913, the world produced almost twice as much steel and more than twice as much pig iron as it did last year, the figures for the prewar year being 74,629,000 tons of ingots and 76,594,000 tons of the primary metal. Under the whiplash of the war's insatiate necessities, steel output was pushed up to 82,650,000 gross tons. Last year just about half this amount was reached. Similar comparisons could be made with pig iron.

The maximum increase in the world's steel output as a result of war efforts was about 10 per cent, showing that most of the steel used during the conflict was diverted from civilian channels of consumption. Even if the present demand for iron and steel were heavy, it is doubtful if the world could turn out much more pig iron or as many ingots at the present time as it did in 1917, owing to the destruction of plants and the dispersal of organizations in central and eastern Europe. Nor are the works in the French war zone back to normal productive standards. In fact the world's capacity this year would be even less than it is were it not for the remarkable reconstruction work effected in Lorraine, coupled with new construction in the Far East and the Antipodes. Today the world's pig iron capacity is probably about 70,000,000 tons and the possible steel output about 80,000,000. Last year on the average about 51 per cent of the world's effective blast furnaces were in operation and almost the same ratio of steelmaking units. In 1921, however, the American production of pig iron was only about 43 per cent of capacity, based on the 1916 maximum, thus showing that the United States curtailed its production of this primary metal more severely than the rest of the world. Steelworks operations, which were about 45 per cent of capacity, also were trimmed more severely in America than elsewhere. This showing would be accentuated were it not for the effect on European production of the three months coal strike last year in Great Britain. In other words the ratio of American production to the world's total is showing a tendency to decline at present. In 1918 the United States produced 60 per cent of the world's steel; in 1919 the figure was 63 per cent; in 1920 it was 62 per cent; and last year the ratio dropped to 49 per cent. This is to be expected in view of the fact that various sections of the Old World are gradually getting back into production.

Judged comparatively last year was not the worst in every country; in fact the strongest producers seem to be the ones that have been hit the hardest both absolutely and comparatively. Six countries produced more pig iron in 1921 than they did the year before. They are Germany, Luxemburg, Austria, Poland, Russia, and Hungary. German output apparently increased about a million tons. The Austrian seccession states, except Czecho-Slovakia all show big gains, and even Russian production is creeping up a trifle. In this part of the world, the physical limitations to production were so severe in the years immediately following the war, that output was increased last year in spite of the relatively lesser demand for iron and steel. These same countries, led by Germany show increases in ingot production last year as compared with 1920. But in central and eastern Europe these advances merely indicate that productive ability is beginning to creep up toward the minimum demands of present business conditions. Viewed broadly the output is still far from normal in this part of the world. The combined pig iron output last year of the former Austrian empire, that is of Czechia, Austria, Hungary and Jugo-Slavia, was about 715,000 tons compared with 2,343,000 tons in 1913. Poland and Russia together last year, show an increased production compared with 1920, but their combined pig iron production in 1921 of 310,000 tons makes a sorry showing beside 4,484,000 tons, the figure for the Russian empire in the last year before the war. In splendid contrast is the ex-



WORLD'S STEEL INGOT OUTPUT BEFORE, DURING AND SINCE WAR

cellent record of the French iron and steel makers. With steady courage in the face of a great economic crisis they have gone ahead with the reconstruction of the iron and steel works in Lorraine and elsewhere in the former war zone, with the result that alone among the western nations France's output showed practically no falling off last year compared with 1920. In fact when the final figures are in, her ingot production may be a little more in 1921 than in 1920.

Great Britain, thanks to the big coal strike in April, May and June, dropped last year from second to fourth place among the iron and steel producing nations of the world. Her output of pig iron fell off from 8,007,900 tons in 1920 to 2,700,000 tons in 1921, with a corresponding although not as great loss in steel production.

Great Britain maintained its exports of iron and steel to better advantage than production. British production last year fell off 60 per cent, while exports for the year, as shown in Table II, were 49 per cent less than in 1920. In fact British exports probably were leading the world at the close of the year, being greater than those of the United States, and on a par with or greater than those of Germany. In export trade France also scores, its outgoing tonnage showing a 50 per cent increase last year over 1920. German trade with the outside world also registered a big gain, while American, British and Belgian exports fell off.

A study of foreign trade in iron and steel since the war would seem to show that if the United States is going to continue to enjoy a share of international trade commensurate with its huge output, more aggressive sales tactics may be necessary during the coming year. There is room for expansion.

The combined exports of the four leading nations, as shown in Table II, were only 8,095,000 tons, compared with 11,753,000 tons in 1920 and 15,583,000 tons before the war, in 1913. As the figures both of production and world trade indicate, 1922 certainly should be a back to business year.

Table I

The World's Production of Iron and Steel

Before, During and Since the War—Gross Tons

Pig Iron

Countries	1921	1920	1919	1918	1917	1913
United States	16,600,000	36,400,000	30,600,000	38,400,000	38,100,000	30,600,000
Canada	635,000	970,000	815,000	1,060,000	1,045,000	1,015,000
Great Britain	2,700,000	8,007,900	7,398,000	9,086,000	9,322,000	10,260,000
France	3,200,000	3,275,000	2,374,000	1,286,000	1,707,000	5,126,000
Belgium	825,000	1,112,500	247,200	.....	8,000	2,428,000
Luxemburg	960,000	685,000	600,000	.....	.....	.....
Italy	50,000	90,000	240,000	309,000	463,000	420,000
Spain	175,000	200,000	.....	.....	.....	.....
Sweden	300,000	460,000	489,000	738,000	816,000	718,000
Germany	8,500,000	7,500,000	6,192,000	11,672,000	12,931,000	19,000,000
Austria	235,000	100,000	.....	.....	2,000,000	2,343,000
Czechia	430,000	640,000	.....	.....	.....	.....
Poland	250,000	100,000	.....	.....	.....	.....
Hungary	50,000	30,000	.....	.....	.....	.....
Russia	60,000	15,000	.....	.....	.....	4,484,000
Japan and China	580,000	700,000	265,000	.....	.....	.....
India	220,000	300,000	265,000	.....	.....	.....
Miscellaneous	40,000	50,000	100,000	1,200,000	2,500,000c	200,000
Total	35,810,000	60,635,400	49,315,200	63,751,000	68,892,000	76,594,000

Steel Ingots

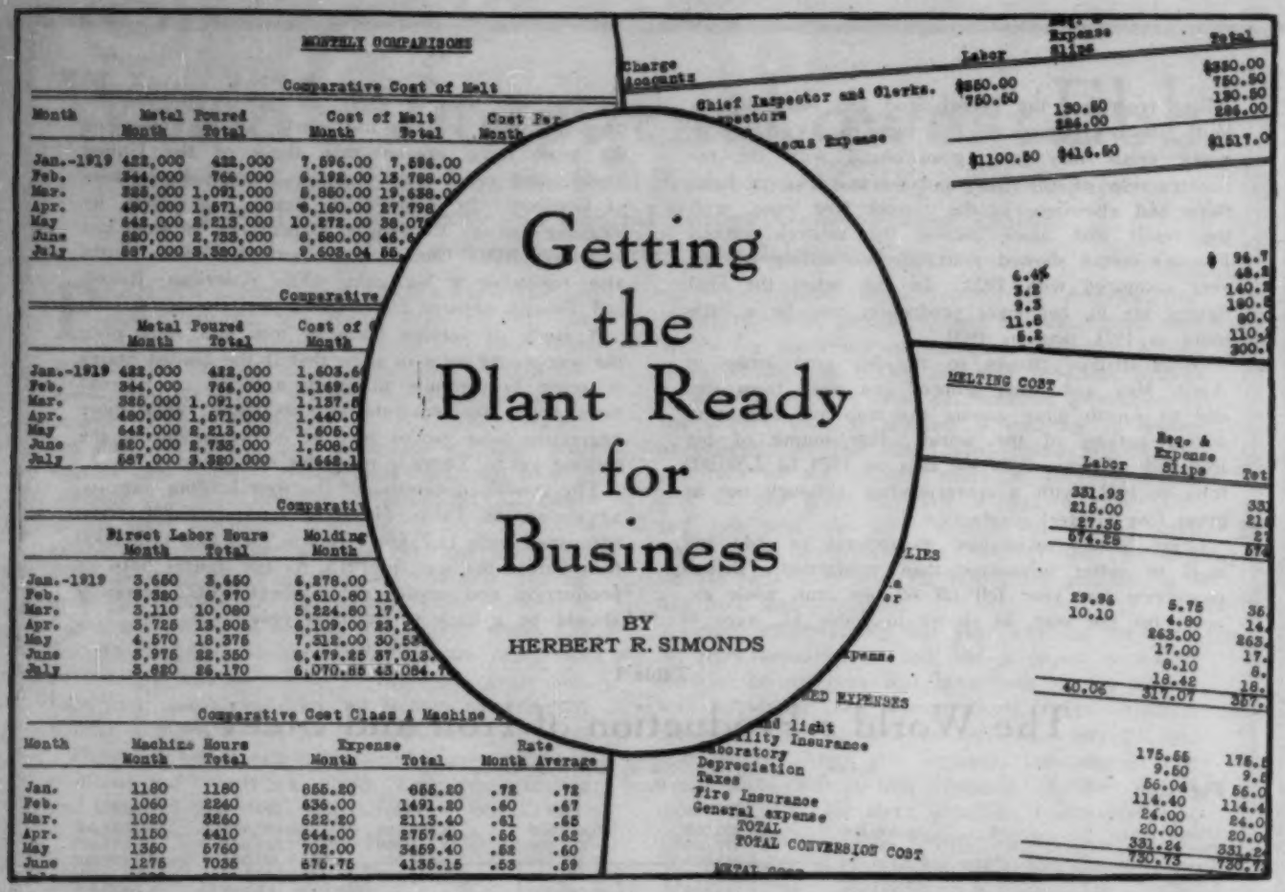
United States	20,100,000	42,100,000	34,700,000	44,500,000	45,000,000	31,300,000
Canada	715,000	1,110,000	920,000	1,690,000	1,562,000	1,048,000
Great Britain	3,700,000	9,057,000	7,894,000	9,539,000	9,717,000	7,664,000
France	2,900,000	2,915,000	2,151,000	1,780,000	2,196,000	4,614,000
Belgium	760,000	1,216,000	336,000	12,000	10,000	2,428,000
Luxemburg	760,000	590,000	385,000	.....	.....	.....
Italy	350,000	774,000	732,000	976,000	1,311,000	918,000
Spain	100,000	150,000	.....	.....	.....	.....
Sweden	146,000	369,000	462,000	517,000	572,000	582,000
Germany	9,000,000	8,000,000	7,644,000	14,738,000	16,322,000	18,631,000
Austria	250,000	125,000	.....	.....	2,872,000	2,584,000
Czechia	710,000	1,000,000	.....	.....	.....	.....
Poland	450,000	60,000	.....	.....	.....	.....
Hungary	90,000	40,000	.....	.....	.....	.....
Russia	100,000	45,000	.....	.....	.....	4,760,000
Japan and China	350,000	470,000	.....	.....	.....	.....
India	150,000	200,000	.....	.....	.....	.....
Miscellaneous	100,000	100,000	.....	300,000	3,088,000c	100,000
Total	40,731,000	68,321,000	55,224,000	74,052,000	82,650,000	74,629,000

c Includes estimate for Russia.

Table II

Exports and Imports of the Principal Countries

Country	Exports 1921	Exports 1920	Exports 1913	Imports 1921	Imports 1920	Imports 1913
United States	2,200,000	4,963,000	2,746,000	115,000	402,000	245,000
Germany	2,250,000	1,751,000	5,664,000	575,000	419,000	284,000
Great Britain	1,650,000	3,253,000	5,049,000	1,625,000	1,108,000	2,231,000
France	1,275,000	895,000	578,000	298,000	1,068,000	155,000
Belgium	720,000	891,000	1,546,000	310,000	804,000	827,000
Total	8,095,000	11,753,800	15,583,000	2,923,000	3,801,000	3,742,000



Getting the Plant Ready for Business

BY
HERBERT R. SIMONDS

THE changes in plant operation necessitated by the shifting demands for manufactured products during the last two years have been far greater than appears on the surface. The activity early in 1920, which was carried-over from the war, involved plant operation of almost a frenzied nature. For the most part, economies were disregarded. Equipment was operated at overcapacity, without thought for its maintenance, and nearly all operations were for the moment without consideration of the future.

From this situation, the changes to comparative inactivity came with astonishing suddenness, and found many manufacturers dazed and hesitating to start constructive planning for the return of business. However the stagnant condition existing in the spring and early summer of 1921 has disappeared and in many lines of industry, production has gradually increased to from 40 or 50 per cent of capacity.

During the period of idleness, manufacturers had an opportunity to take stock of their position and to start cleaning house for the return of business which they knew must come. In returning to partial activity, many new elements have entered into the plant owners' problem. They have been faced with the keenest competition that has existed in many years, the worst feature being that the struggle for orders has not always been based on an intelligent conception of true competition. Many manufacturers do not know how to determine costs under existing conditions. The overhead burden has been greatly increased, and plants which during the war were expanded to double or triple their original size now must be carried in spite of a greatly reduced output. The working forces, swelled to meet the needs of wartime activity, have been sharply curtailed and wages have been lowered. The problem of reassembling and reorganizing the plant personnel and adjusting wages in accord with present conditions constitutes one of the biggest tasks now confronted by employers.

Many Problems Involved

Therefore, the principal problems facing the owner or manager in the transition from an almost idle plant to one of partial activity, may be summarized as follows: Adjustment of wages; rearrangement of equipment; re-establishment of cost systems; and the education of the personnel, from the lowest paid workman up to the head of the organization, to the new order of things.

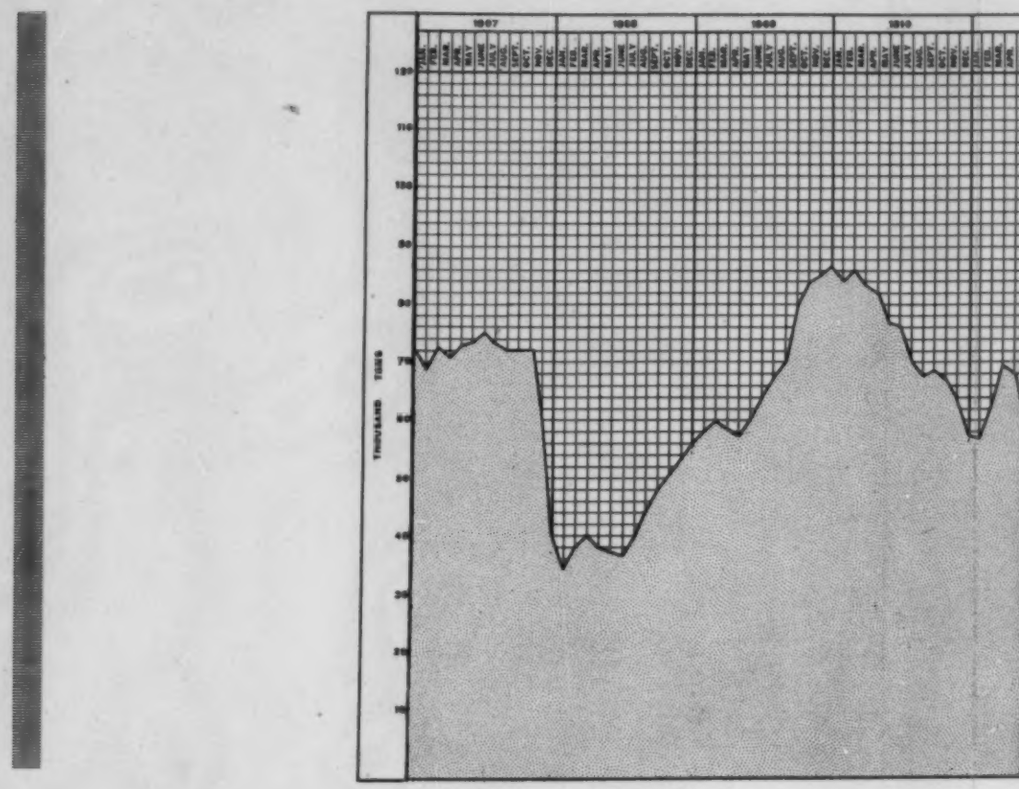
A fifth problem is that of securing new business, which to a great extent does not concern the subject under discussion. However, one phase has a direct bearing on the new plant operation. Manufacturers confronted with greater plant capacity than is justified by normal demand have in some cases broadened their fields of operation and devoted the excess plant facilities to the manufacture of new products.

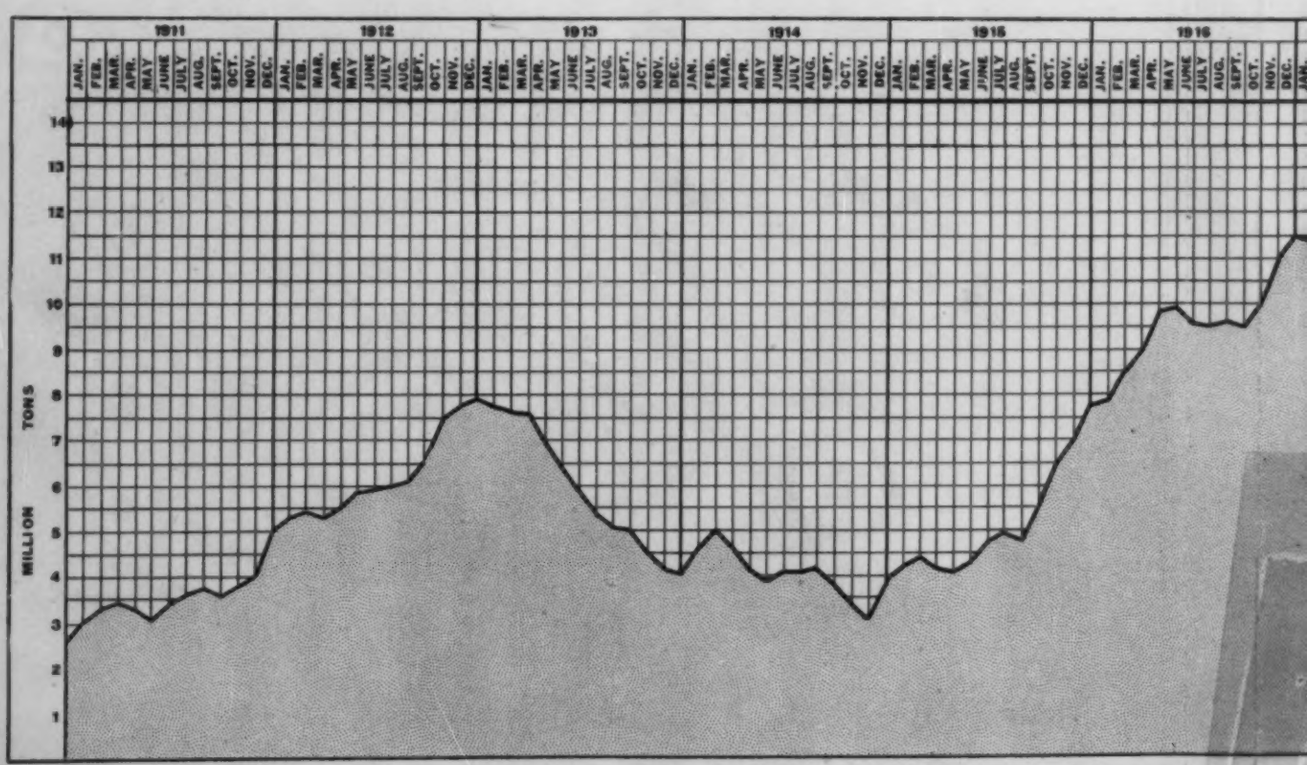
In a sense the new order of things is welcomed by many manufacturers as an opportunity to reap results in truer proportion to the effort and industry sown. A wise observer inspecting a large plant during the rush of production of 1920 must have known that the world could not continue to support the waste and inefficiency which he saw on every hand. One manufacturer of pressed metal parts says that during the peak of activity at his plant, he noticed stampings made in such a way as to cause fully twice as much scrap as necessary. All that was needed to cut down the waste was a rearrangement of the dies. The manager knew this, but did not have time to stop and make the changes.

Doubtless, if the excessive production throughout the country had continued there would have come a time when efficiency and economy would have received consideration commensurate with their importance. The country's plant capacity would have grown until it occupied the same proportion to demand that it did under prewar normal

Supplement to the Jan. 5, 1922 issue of THE IRON TRADE REVIEW

Charts showing production o





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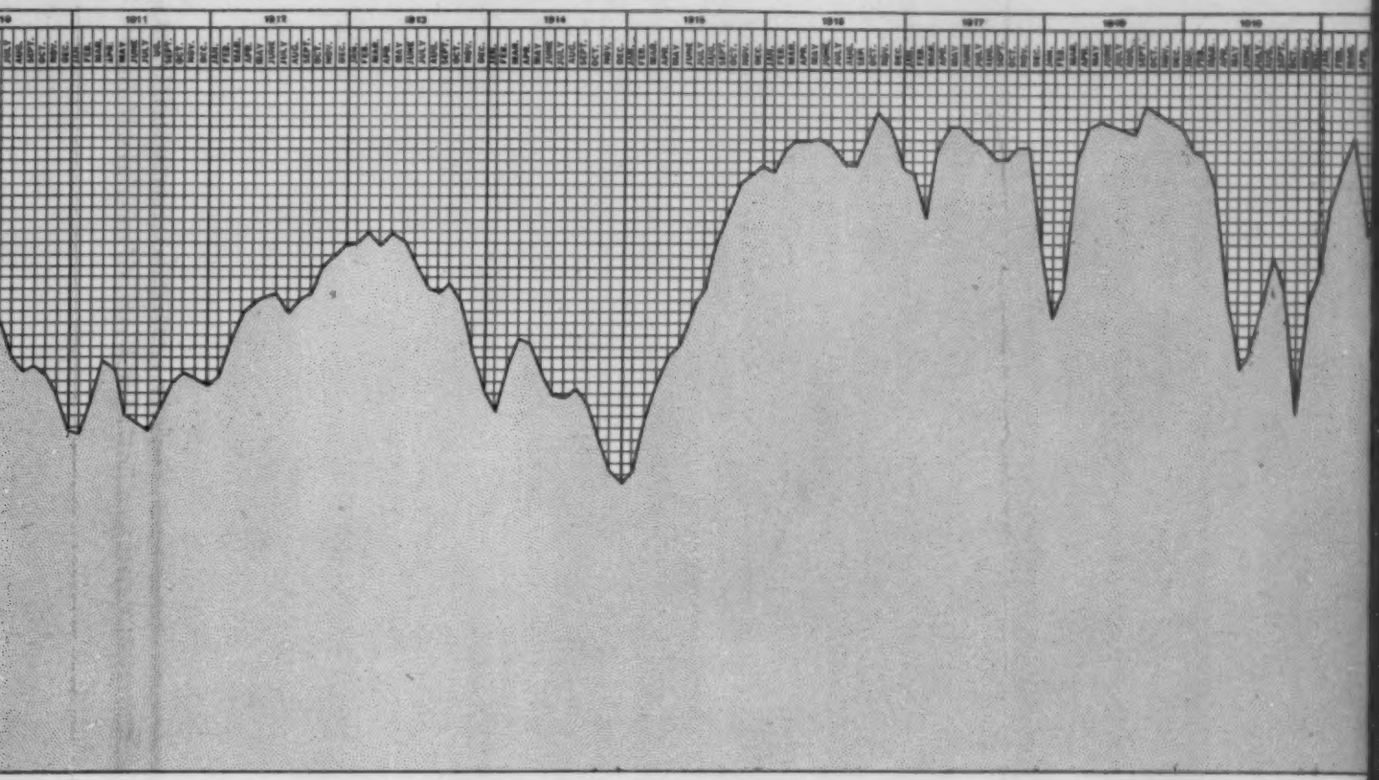
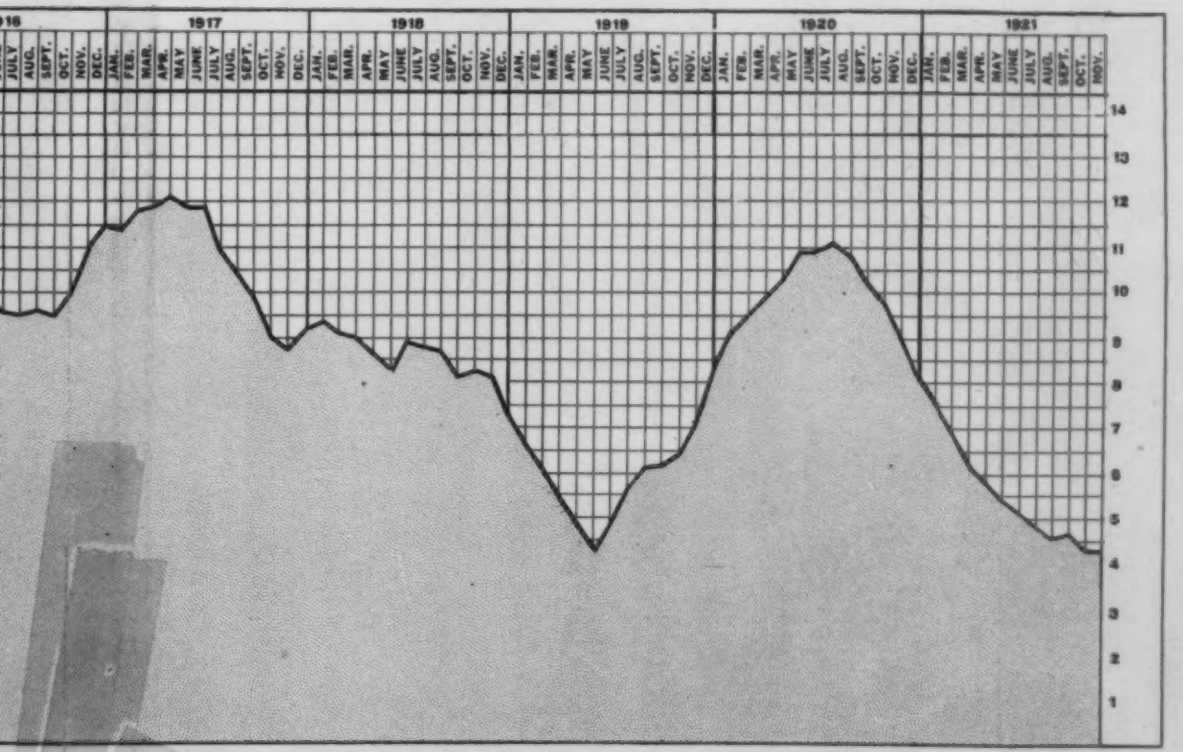
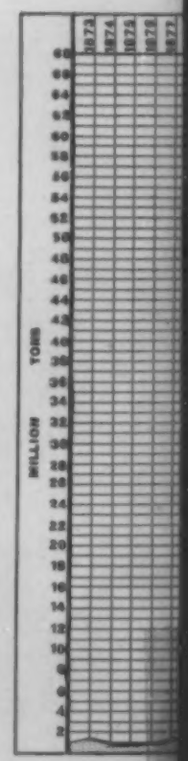


DAILY AVERAGE PRODUCTION OF COKE AND ANTHRACITE PIG IRON 1907-1921





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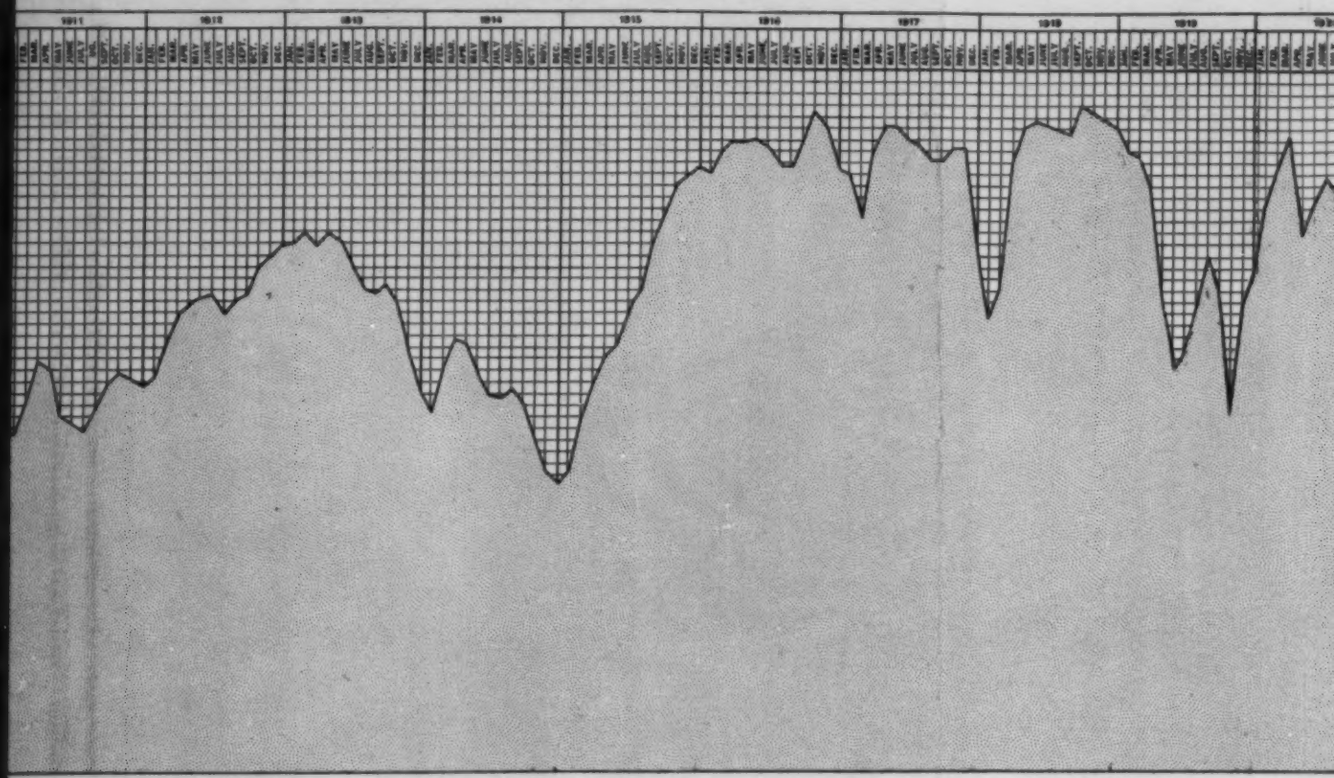

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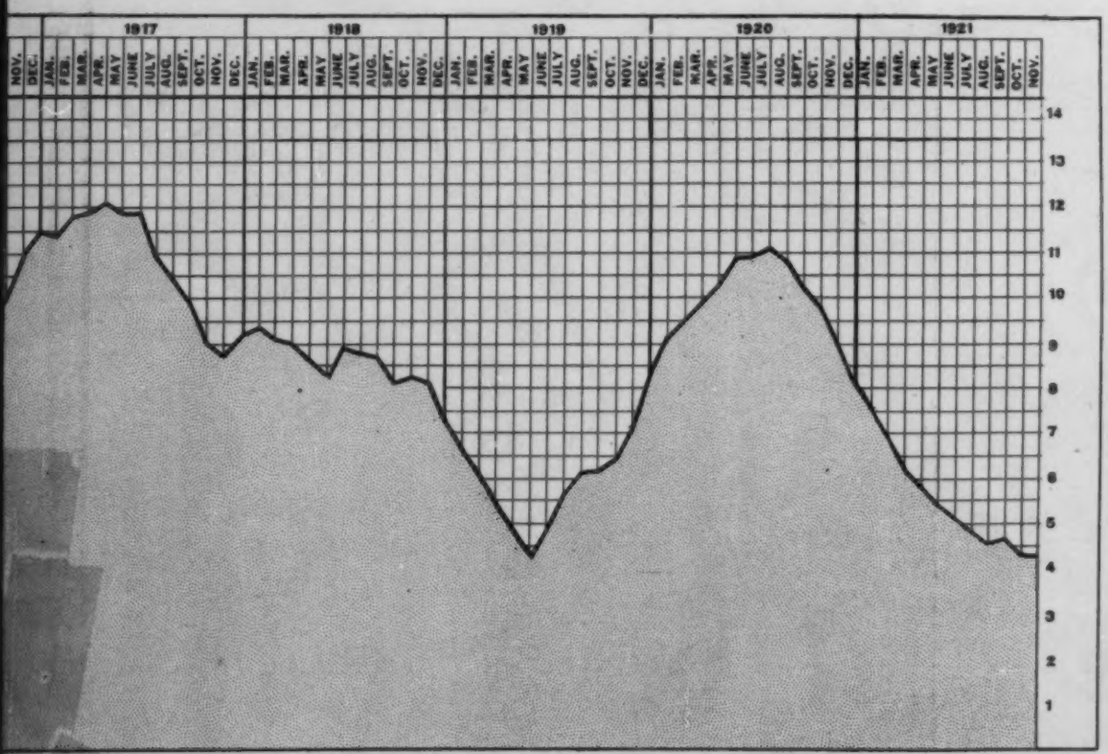
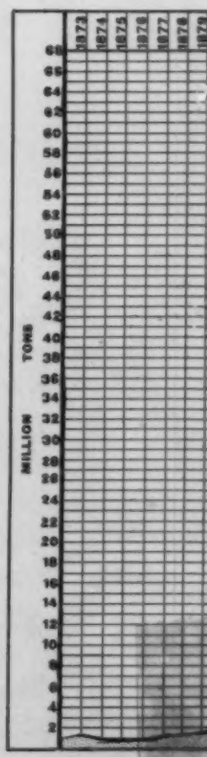
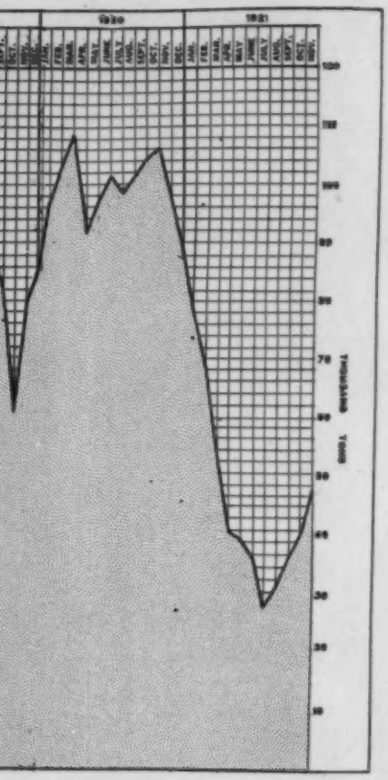
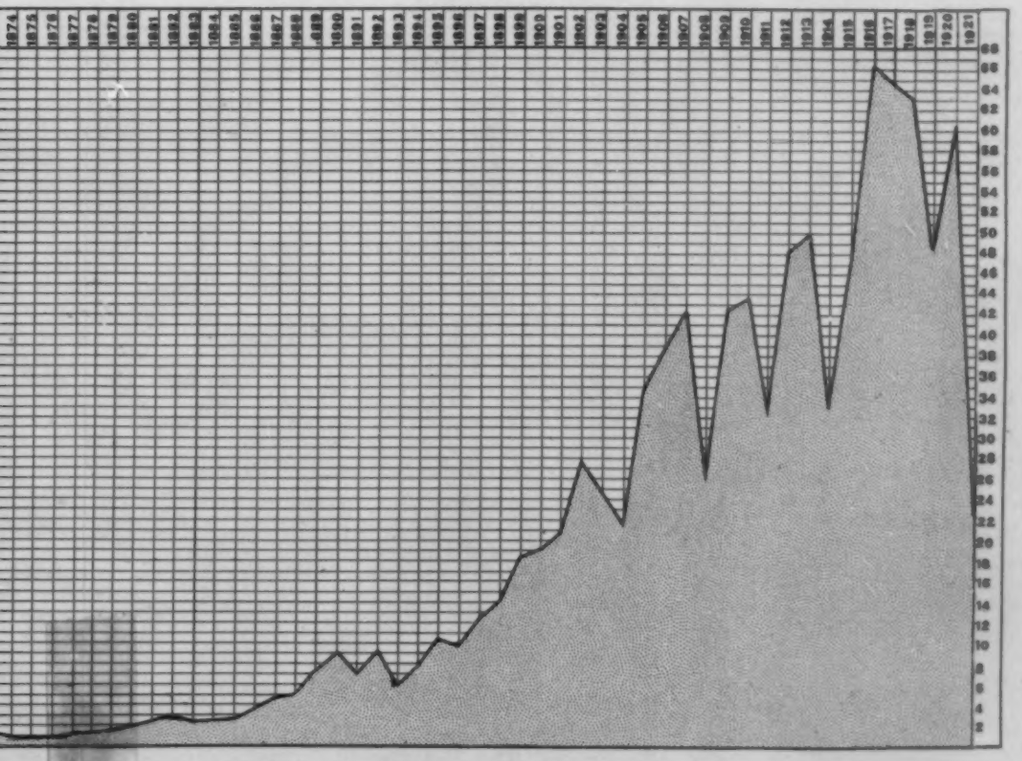




STATES STEEL CORP. 1911-1921

iron ore





SEASON'S SHIPMENTS LAKE SUPERIOR IRON ORE 1873-1921

conditions. This brings up the question as to whether the business depression will mean an actual physical reduction in plant capacities. In other words, will a proportion of the plants and manufacturing buildings have to be closed down or put to other uses before manufacturing can return to its former profitable position? The answer to this depends largely upon the production rate of the future. If the country is to settle down to a normal production considerably below that of 1920, it will probably mean that the companies which are carrying too great an overhead burden will be forced out of business and the ratio between plant capacity and national demand will be re-established along lines approximating those in effect in 1912 and 1913. However, it is more likely that the normal production of the future will accord with that required by a gradual annual increase figured from the years previous to the disturbing influence of the war. However, the important problem, before the average manufacturer is a readjustment to operating conditions somewhat below his idea of normal capacity and considerably above his plant's actual condition in 1913 and 1914.

Adjustment of Wages

One of the first problems confronting manufacturers is wage reduction. A maker of pipe fittings, for instance, finds that his competitor in an adjoining state is paying 5 cents an hour less to his workers and therefore is able to sell fittings at a lower figure. A general foundry manager finds that his competitor is using the piece-work system of wage payment. A fabricating plant owner finds his competitor is on an open shop basis and thus is relieved of many obligations which hinder efficiency. In each of these cases, some remedy must be found and this has often been a more difficult problem than appears on the surface.

Successful reduction of wages requires the utmost tact, particularly when this must be accomplished coincident with an increase in labor efficiency. By far the majority of industrial plants have made general or sweeping reductions based on a certain percentage of the former wage scale and have advanced the reduced cost of living as the chief reason. A number of plants have been closed and started up anew, independent of the old wages and the old personnel. In other instances, manufacturers have welcomed the changed order of things as a means of cleaning house. As a rule in these cases no general reductions have been made, but the management has gone through the organization with a fine tooth comb and kept only those who were profitable to the company at the existing rate of pay. Additional employes are carefully selected and hired at the new level of wages. This plan has been remarkably successful in several plants. In one case, a large machine tool manufacturer has retained about one fourth of his 1920 personnel, has not cut wages, but has placed his men in more responsible positions than they held previously.

Foundries in large numbers than ever before have turned to the piece rate system. Operations which heretofore were considered outside of the scope of piece work compensation time and again have been included in a satisfactory working scheme of payment according to rate of individual output. Thus, in a large eastern stove manufacturing plant, the entire shop organization, numbering about 600, with the exception of superintendents, has been placed on compensation based on number of pieces handled.

Rightly viewed the problem of reducing wages offers an opportunity rather than a handicap to the plant owner and the repeated experience of large plants indicates that reductions in pay may be made and output per man increased at the same time. The intelligent plant manager considers cost of production first and wage reduction second.

Changes in Equipment

Increased efficiency has been the keynote in all plant readjustments during the last few months. Equipment has been given a more intensive study and inspection than in many years. The manufacturer, who started going over his plant equipment the minute orders ceased and his production fell off is the one best suited to meet today's competition. Equipment was abused during the time of excess production. The maintenance of machine tools was neglected and insufficient consideration was given to the problem of utilizing machines on the class of work to which they are best adapted. Faced with the problem of getting the plant back into operation on a reduced schedule and yet with increased efficiency, equipment has had to undergo radical changes.

The solution of the problem is not always retrenchment. One manufacturer who at one time was content to have coal hauled from the coal pile to the boilers in eight wheelbarrows now has replaced these with a tractor, shown in Fig. 2. A foundry faced with operating at about 50 per cent of the 1920 rate has put its molding machines on tracks

FIG. 2—AN EASTERN MANUFACTURER IS EFFECTING ECONOMY BY USING A GASOLINE TRACTOR TO HAUL COAL TO THE POWER HOUSE—A TASK WHICH HERETOFORE REQUIRED THE SERVICES OF EIGHT LABORERS EQUIPPED WITH WHEELBARROWS

FIG 3—THE WAR LEFT THE OWNER OF THIS PLANT WITH EXCESS MANUFACTURING FACILITIES; THEREFORE, HE ENGAGED IN A NEW LINE OF ACTIVITY TO KEEP THE PLANT BUSY. AUTOMOBILE PARTS ARE REPAIRED

so as to increase the production per molder. This is shown in Fig. 5. In this particular case, the machine follows the sand heap and at the same time cuts down the distance which the molder must travel to place the completed molds on the floor. By this means alone, the efficiency of the individual molder was increased over 15 per cent. A manufacturer doing a large amount of welding met the problem of getting his plant in operation on a reduced output by installing a plant for making his own oxygen. Equipment everywhere has had to satisfy the question "Will it pay?" Machines designed to turn out 10,000 pieces a day may not be suitable for a production of 5000 pieces a day and so may have to be replaced by new equipment of smaller capacity. Usually the larger machines have been retained in the hope of returning demand to warrant their use. At least one foundry with one large cupola has purchased a new smaller one in order to compete on the reduced production basis. Consideration of the scrap problem is another matter which has come into prominence in connection with getting the plant ready for competitive operation. One manufacturer has installed the waste baling machine shown in Fig. 4, in order to effect economies in his plant's waste products.

To enumerate the changes in equipment which have been made in getting the plant ready for business would be to enumerate a great number of plans for promoting efficiency, and this, while interesting, if such a list could be compiled nevertheless is beyond the scope of this article. In the majority of cases, the plant manager has inspected his tools, made repairs where necessary and disposed of such equipment as was manifestly inefficient to operate. Labor saving devices have received attention. In this connection, several plants have installed fuel oil burning equipment to replace coal. A number of large organizations have had surveys made of their equipment to determine the most profitable purposes to which it could be applied and as a result of this, tools often have been shipped from one plant to another or sold and other tools purchased. One manufacturer of machine tools faced with the problem of carrying a plant twice the size of his estimated requirements over the next few years, has taken on a line of automobile parts and virtually established a second and independent organization under the roof of his old plant. Another maufacturer, finding his truck equipment in excess of his needs, started a delivery system to customers within a 100 mile radius at railroad freight rates.

FIG. 4—INCREASED ATTENTION TO ROUTING IS NECESSARY IN GETTING BACK TO BUSINESS ON AN EFFICIENT BASIS. THIS ROUTE CHARTS MAKES IT POSSIBLE TO FOLLOW ALL JOBS GRAPHICALLY

The worst form of competition is caused by lack of proper cost accounting. Of itself a cost system will not improve conditions, but it furnishes the means of practicing many economies. By means of a proper cost plan responsibility for inefficiency may be placed in individual departments. One of the demands placed upon a cost system is the determination of a basis for establishing the sale prices of manufactured articles and herein lies a pitfall for the inexperienced manufacturer who tries to distribute costs when the plant is on a below-capacity basis of production. If prices now are based on costs which include a distribution of the entire overhead, it often is impossible to obtain business. It is obvious that the total overhead cannot be distributed to determine sales prices in times of low production, in the same way that it is distributed when the plant is operating at capacity. Some plant owners, baffled by this problem, have eliminated overhead altogether and as a result have placed goods on the market at too low a figure. One plant manager states that actual costs including all overhead and other expenses, should be charged to cost even with curtailed production, and that a running loss item should be entered to make up the difference between the selling price and the higher cost of the product, if such proved to be the case. Whatever solution the manufacturer adopts, it is sheer folly to ignore either all or part of the overhead.

A chain manufacturer recently reported that he had increased his output per man by nearly 30 per cent com-

pared with that of the mid-summer of 1920. When asked how he had done this, he replied "By talking to the men". Managers now have an opportunity of talking to their men. There is time for foremen's meetings and for taking employes into the confidence of the management. In general men are working harder today than they were a year ago. To some extent this is the natural result of the increased number who are without employment. The job is more important to the individual now than it was a year ago. A better morale has been created by the presence of a common enemy—dull times—and by increased efforts and attention on the part of management. Much may be done in getting the plant ready for business along the line of improved plant morale and the manager who does not take full advantage of the opportunity is apt to be left behind in the keen business competition which is ahead.

Getting Back To Business in Tool Industry

(*Concluded from Page* 18)

ting machine. Its main casting is of rectangular box form with a cylindrical portion at on end. A ram which carries the work arbor is mounted in the center of this cylindrical part and the tool head is mounted above the ram. A crankshaft which drives the ram has bearings near the top of the rectangular section and is provided with an adjustable head at the end next to the ram. It is driven through back gears by an individual motor. The extreme height of the machine renders it necessary to provide a scaffold floor with a short flight of steps leading up to it.

The principal feature of interest is the tool head holding the radial tools. An annular sectional cam ring provides for feeding the tools toward a common center. When they have been fed to their full depth the feed stops, but the gear continues to move up and down and the indexing device continues to act until the gear blank has made one complete revolution. This feature secures uniformity in all the teeth cut.

The writer is quite well aware that there are yet in the formative state of design many good and practical machines which will soon appear on the market. There is every indication that next year will witness a great number of new designs, and that the return of business will find machine tool builders in a position to supply better equipment than they have ever been able to build before.

Business Wins the Aid of Washington

(*Concluded from Page* 9)

ence to the letter of the Transportation act, requiring rates bringing in a minimum net return of 5½ per cent, effectually blocked anything like a general reduction. The outlook for a lowering of transportation charges loomed brightest just at the close of the year, for in mid-December the commission inaugurated its general rate hearing to which iron and steel producers have contributed their testimony. Comparing the close of 1921 with the close of 1920, the factors bearing most heavily upon rate making are far more propitious at this time for a reduction than a year ago.

The successful conclusion of the arms conference which convened in Washington on Nov. 12 inevitably will have its reflection in the iron and steel industry as one of the three largest tax-paying groups, but it has already served the useful purpose of clearing the industry of any ulterior motive in military preparedness. It was a revelation to the nation that the army and naval establishments take, on the average, only one-half of 1 per cent of the steel production of the country. Considering that since the signing of the armistice obligations from all wars have consumed 68 per cent of the nation's expenditures while appropriations for the army and navy have accounted for 25 per cent more, it is no wonder that business is buoyant at the prospects of lighter taxation.

Trade and industry can be no more flourishing than the state of relations between employer and employe permits, hence 1921 is noteworthy for having had recognition from the White House of the great desirability of adjudicating industrial disagreements with the factor of public interest given proper weight. The thought of President Harding in the message he delivered personally to congress on Dec. 6 is illuminating:

"The right of labor to organize is just as fundamental and necessary as is the right of capital to organize. The right of labor to negotiate, to deal with and solve its particular problems in an organized way, through its chosen agents, is just as essential as is the right of capital to organize, to maintain corporations, to limit the liabilities to stockholders. Indeed, we have come to recognize that the limited liability of the citizen as a member of a labor organization closely parallels the limitation of liability of the citizen as a stockholder in a corporation for profit.

"In an industrial society such as ours the strike, the lockout, and the boycott are as much out of place and as disastrous in their results as is war or armed revolution in the domain of politics. The same disposition to reasonableness, to conciliation, to recognition of the other side's point of view, the same provision of fair and recognized tribunals and processes, ought to make it possible to solve the one set of questions as easily as the other. A solution is possible.

"The consideration of such a policy would necessitate the exercise of care and deliberation in the construction of a code and a charter of elemental rights, dealing with the relations of employer and employe. This foundation in the law, dealing with the modern conditions of social and economic life, would hasten the building of the temple of peace in industry which a rejoicing nation would acclaim."

FIG. 5—LABOR SAVING DEVICES WILL PLAY AN IMPORTANT PART IN MEETING KEEN COMPETITION. IN THIS CASE THE MOLDING MACHINE HAS BEEN PLACED ON WHEELS SO THAT THE MOLDER CAN FOLLOW THE SAND PILE, THUS SAVING TIME AND LABOR

Economy Is Watchword for 1922

Metallurgical Progress in Iron and Steel Industry During Past Year Reflects Concentration of Effort To Increase Efficiency—Greater Fuel Economy Is Sought as Means of Meeting Industrial Competition

FOR the first time in six years the iron and steel industry is confronted by a single, definite, but highly important metallurgical problem. During the war the services of engineers and operators were required for hurried attention to emergencies, and in the frenzied aftermath of 1919 and 1920 they were occupied in combating the disturbing effects of low-quality fuel, uncertain delivery of materials and intermittent operation of iron and steel works. Their time was so fully devoted to the work of the moment that no opportunity was offered for preparing for future contingencies.

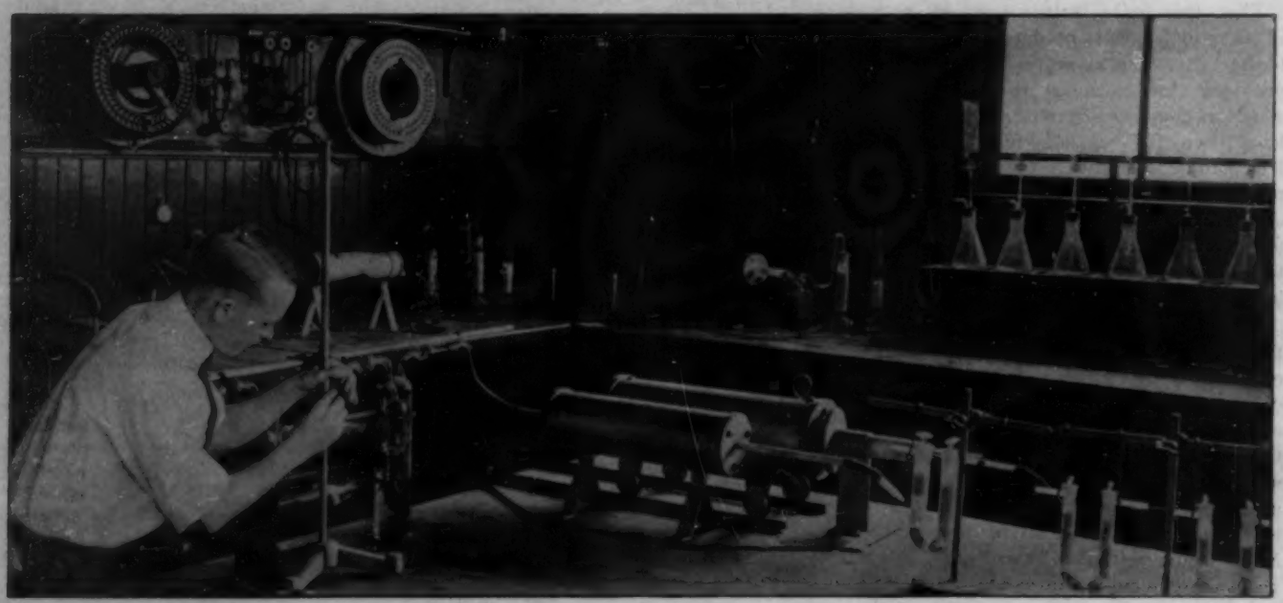
However, the events of 1921 have completely altered this situation. The reduced rate of furnace and mill operation has left the technical experts free to consider the metallurgical needs of the future, and in many cases results already have been achieved.

The outstanding metallurgical problem is unmistakable to those who read the signs of the times. Manufacturers realize that in getting back to business they must face keen competition, necessitating operating on a basis of strict economy. The ways and means of effecting this economy lie largely within the scope of metallurgy. Naturally the most fertile field for applying conservation is in the consumption of fuel, and a careful analysis of the metallurgical developments of 1921 indicates that much attention is being given to this problem.

In the ironmaking industry efforts are being made to reduce the consumption of coke, to lower the output of flue dust and to more efficiently utilize that which is produced, and to recover a greater percentage of the iron bearing material now being carried off in the waste washer water. The successful coking of so-called "noncoking" Midwest coals, predicted in last year's review in these columns, is an important achievement, and takes on additional significance because of the prevailing high freight on coking coal from Pennsylvania and Ohio sources.

In the metallurgy of steelmaking no development in 1921 has received more attention or offered greater promise of success than the efforts being made in at least four different plants to increase the fuel efficiency of the open hearth. The McKune system, described in THE IRON TRADE REVIEW a year ago, the Egler process, the venturi-line furnace and a combination of the McKune and venturi-line ideas have been developed to the point where definite results have been obtained under practical operating conditions. That progress is being made in electric furnace practice is indicated by the installation and successful operation during the year of two 40-ton units and by the contemplated construction of still larger furnaces for a company which originally had planned to erect a blast furnace.

Fuel economy also has been the watchword in the development of heating and treating furnaces, the principal advance having been made through improved control of the heat. For annealing malleable castings, one company has designed a car-type furnace in which castings packed in sand in cars are pushed into the oven and drawn out as soon after the anneal as the metal is below the recalescent point, enabling another car to be pushed into the oven while it is hot.



Seek To Reduce Losses in Ironmaking

BY L. A. TOUZALIN

FROM the standpoint of the blast furnace operator, conditions in 1921 were in sharp contrast with those of 1920. The after-effects of the war made themselves felt during the year 1920 by a series of irregularities of raw materials and abnormal working conditions. During the early part of the year just ended a change was gradually brought about by the industrial depression. Due largely to the fact that furnace after furnace faced a diminishing demand for its product and was blown out or banked, the irregularities above mentioned disappeared one by one. About the middle of the year it was evident that the question of operating economy was of paramount importance and soon would determine which furnace plants could meet the rigid requirements of the day and continue to operate under the new conditions.

It was only natural that in the face of coke, car and labor shortages of the preceding years, production economy should have become of secondary importance. The demand had been for iron tonnages at any price. In the face of a falling market, however, it became necessary for furnace operators to divert their attention from overcoming operating irregularities to the re-employment of all possible means of reducing their production costs. And it is safe to predict that the coming year will witness a still more intensive campaign of economy in the manufacture of iron in order to meet the keen competition which is bound to usher in a resumption of normal iron and steel production throughout the country.

The low ebb of demand for iron was reached about September and some furnaces which had been banked at the beginning of the year resumed operation during October. Some of these furnaces made remarkable records in the rapid and satisfactory manner in which they "came in" after long periods of banking. At one plant two furnaces which had been banked for over seven months, each produced over 400 tons of iron on the second day in blast, all of which was satisfactory for steelmaking purposes. Blast furnace operators have added materially to their knowledge of banking and blowing out practice during the slack periods of the past year.

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Furnace Design Is Modified

The period of slack operation has afforded a great opportunity for many plants to overhaul and improve their blast furnaces and auxiliary equipment. Some furnaces have been remodeled and enlarged. The tendency to enlarge the hearth diameter and to increase the bosh angle was again noticeable during the past year. The results obtained on furnaces of this type during the past year are sufficiently encouraging to indicate that practically, as well as theoretically, these changes have resulted in increased production and smoother operation. At other plants the blowing equipment has been brought up to date by the replacement of mechanical with automatic air valves. At one large plant a new power plant which will house four large gas driven electric generators is well under way. Under the present conditions of necessity for greatest possible economy of operation it is certain that the more economical production of power is bound to receive increasing consideration during the coming year. Changes in by-product coke plants have been made to permit the coking of the coal to be accomplished by the burning of blast furnace gas, thus making the coke oven gas available for sale to public utilities or available for heating furnace use. It may confidently be expected that these plants which have wisely taken advantage of this opportunity to prepare for coming busy times will be rewarded by consistent improvements in their practice and in better quality of their product.

The necessity for greater economy as mentioned above will undoubtedly form an active stimulus for the solving of several important problems, during the coming year. Among those which may be mentioned are decreased coke consumption, decreased production of flue dust, efficient means of consuming current flue dust production, and recovery of the iron bearing material carried off at present by waste washer water. The question of coke economy is of particular importance owing to the high transportation cost due to the prevailing high freight rates. A reduction of the percentage of ash in coke would not only cut down the consumption and transportation cost per ton of iron produced, but would also permit of the use of leaner and cheaper ores. In other words, the same slag volume may be maintained by reducing the silica content of the fuel and increasing the silica in the ores correspondingly. The transportation cost of ores by water, or by water and rail, have naturally not increased to the extent that the all-rail hauling cost for coke has advanced. Some plants have equipped themselves to haul the coal to their coke plants by water in order to avoid the high rail freight rates. Those plants which have taken advantage of this means of coal transportation have made a handsome saving on their cost of coke during the past year.

More efficient methods of screening coke will also tend to reduce the coke consumption and the amount of flue dust produced. This screening should preferably be done at the coke plant, but in some cases it has been found to be advisable to re-screen the coke at the furnaces on the way to the skip tubs. Several plants have installed revolving disk grizzlies for this purpose, and their experience to date, while limited, indicates clearly that the saving in coke consumption and in more regular quality of iron

produced, more than compensates for the cost of the additional treatment.

Another factor which will aid materially in reducing the cost of coke is the coking of cheaper coal, or coal located closer to the ovens. One of the most important events of the past year was the satisfactory coking of 100 per cent Illinois and Indiana coal in a western plant for blast furnace use. The majority of blast furnace operators feel that the solving of this question is now merely a matter of days.

While the curtailment of business during the past year has undoubtedly delayed some of the expected refinements in blast furnace practice, nevertheless, many problems have received attention on a small scale which will help materially to bring about more extended work during 1922. One plant has installed an experimental continuous filter for recovering the solids in waste washer water. The time is too short at present to draw any conclusions, but sufficient experimental work has been done throughout the country during the past year to indicate that the recovery of the iron bearing material in waste washer water will cut down the present furnace loss to the extent of approximately 50 per cent. This is another way in which the cost of iron production may be reduced.

Find Uses for Excess Slag

There has been a long felt want for some practical use for the excess of blast furnace slag above that required for cement manufacture. During the past year an increased tonnage of granulated slag has been sold for the manufacture of a building brick which appears to be slowly gaining in popularity. Crushed blast furnace slag has been used to an increased extent during the past year or two for replacing crushed stone in concrete and grading work. The chemical reasons for the slacking of this material in the past, which has prejudiced consumers against it, have received considerable study and it is safe to state that they have been overcome to such an extent that there need be no fear from this source if proper means are taken to make slag of the proper chemical composition. The further expansion of the crushed slag trade together with the manufacture of slag-made building brick mentioned above will have a beneficial effect on blast furnace economy.

Results Follow Changes in Port Design

BY JOHN HOWE HALL

EXCEEDING in interest all other developments in steelmaking during the year are the changes being made in the design of the ports of open-hearth furnaces. The modifications have been made partly in an effort to successfully burn by-product coke oven gas and partly with a view to increasing the life of the ports and speeding up the operation of the furnaces. In what has become the standard design of open-hearth port, the flame at the outgoing end strikes directly on the port and melts away the brick work rapidly. The result has been that when the port has grown short the operation of the furnace is less efficient than when the port is at the correct length. In addition, of course, the necessity for frequent repairs has made operating costs rather high.

In past years effort has been directed to increasing the life of the port by water cooling and to decreasing the repair time by building the port in a separate removable frame so that a new one could be substituted in the least possible time. Both of these methods have been palliatives rather than cures.

The first of the radical changes in design introduced recently, known as the Egler port, has been installed at the plant of the Brier Hill Steel Co. The first furnace of this design burns producer gas and positive pressure is applied to both air and gas by means of a blower. The gas comes up a flue which is placed in the position usually occupied by the air flue, which turns over at the usual angle to form the port. The air is brought up through a vertical flue and comes into the port from the bottom some distance back of the mouth of the port. The air and gas are intimately mixed in the port so that the flame is formed close to the mouth of the port, much in the manner of the flame in a blowtorch. The temperature in the ports is said to be not unduly high, and the combustion of the gas is practically completed in the first few feet of the hearth.

At each end of the furnaces are two auxiliary flues leading to the checkers which can be closed by means of water cooled, mushroom valves. The two flues at the out-going end of the furnace are kept open and those at the in-coming end are closed by the valves. By means of this increase in the area of the passages which carry away the products of combustion, the gases at the out-going end are slowed down. The roof is kept cool by a slow moving body of air which is provided by the small surplus introduced over that needed for combustion of the gas. In operation a high hearth temperature and nearly perfect transmission of the heat to the bath have been secured, resulting in greatly increased output. The design has been modified for burning coke oven gas and natural gas. For these fuels only one set of regenerators is used for the air, and the gas is admitted by two pipes one on each side of the port. Oil or tar can also be burned and are introduced through a burner in the end wall.

At the plant of the Steel Co. of Canada the McKune design has been successfully tried out for by-product coke oven gas. The general features of this design, and the object sought were outlined in the last annual issue of THE IRON TRADE REVIEW. For coke oven gas the furnace is provided with three up-take flues of which the two outside ones can be closed by dampers. The air under a fan pressure of about 6 ounces comes up the central flue which leads to the port and the gas is introduced through pipes at each side of the port at an angle of 90 degrees. The two auxiliary flues at the intake end are closed by the dampers and those at the out-going end are kept open in order to increase the area at that end, and slow down the out-going products of combustion. The gas burns completely in the first 10 feet of the hearth, and the output of the furnace has been greatly increased over what was possible with the old standard design, actual tests having demonstrated this.

At the South Chicago works of the United States Steel Corp., a design known as the venturi-line furnace has been built and operated on producer gas. The idea in building this furnace was to protect the ports and improve the efficiency of combustion by slowing down the gases at the out-going end. With this in view, the port area was decreased by lowering the roof knuckles and moving in the two wingwalls to form vertical knuckles at each side giving restricted openings in two planes. In addition, the mouth of the port proper was placed about 13 feet back of the point of greatest restriction, giving a

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channel where air and gas might mix before entering the hearth. As the furnace was provided with a waste-heat boiler, induced draft is used but no pressure is put on the entering air and gas.

At the same plant, a combination of the McKune and venturi-line furnace is being worked out in which water-cooled dampers, which can be lowered on either side of the gas port, take the place of the knuckles in the side walls. These dampers, of course, are raised at the out-going end and are lowered at the in-coming end, giving an opening of 13 square feet at the latter and 31 square feet where the products of combustion leave the furnace. The air is introduced under pressure, by means of a fan and the furnace operates with induced draft to take care of the waste-heat boilers.

By these changes in design the hearth temperatures of the open-hearth furnace have been considerably increased, the combustion of the fuel has been completed in the first few feet of the hearth, and as a result the time per heat has been considerably reduced and the output increased.

At the Duquesne works of the Carnegie Steel Co. considerable study has been given to the burning of by-product coke oven gas. This fuel has always been a difficult one to burn successfully because the flame has had a tendency to rise from the bath and it has been difficult to make the flame luminous. In the past tar has been blown in over the gas to give luminosity to the flame. It has been discovered that by admitting a small amount of air in the burner with the coke oven gas a luminous flame can be obtained, and that by varying the amount of air so admitted, the flame can be varied at will from non-luminous to bright. At the Duquesne plant it is necessary at intervals to clean the underground flues which carry the producer gas to the furnace, and recently arrangements were made to supply the furnaces with by-product coke oven gas during this cleaning out period. The furnaces are successfully operated with this fuel while the flues are being cleaned and several longer runs have been made, one furnace turning out 55 straight heats with by-product gas.

Benjamin Talbot has taken out patents and is designing an open-hearth furnace of large capacity to be used for a continuous process. He contemplates using twin hearths with a wall running between them lengthwise of the furnace and supporting the extremely wide roof necessary for this design. Passages are provided through this dividing wall to connect the two hearths, and the furnace is arranged to tilt endways instead of sideways. The capacities proposed are considerably greater than that of any furnace now built.

An interesting article appeared during the year describing the operation of two large cupolas to provide hot metal for four 60-ton basic, open-hearth furnaces. The plant in which this run was made had a blast furnace but no mixer, and the experiment was undertaken during repairs to the blast furnace with the idea of securing greater output from the open-hearth furnaces than was possible with

cold charges. About 20,000 tons of pig were available for the trial, of which approximately 13,000 tons were melted. This iron varied in silicon from ½ to 6 per cent and was mixed in one heap so that in melting cold charges trouble was experienced at intervals when a large proportion of high silicon iron was charged and the bath melted high in silicon with resulting increase in the length of the heat.

Two spiegel cupolas, 6 feet in diameter inside the lining and 30 feet high to the charging doors, were used to melt the pig iron. At first it was thought that these cupolas could not supply the iron fast enough, but it was found that averaging 18 hours on blast out of a possible 24, the cupolas melted enough iron to supply each of the four open-hearth furnaces with 50 tons of metal at suitable intervals.

By varying the amount of limestone charged with the pig iron, a considerable proportion of silicon in the pig was eliminated and this method was used with success in handling the high-silicon iron in the heap. An experiment on so large a scale is interesting, and suggests the possibility of securing increased output from the open-hearth furnace in small plants not provided with blast furnaces. In this particular trial during one month the open-hearth furnaces produced more steel than in any corresponding period when hot metal from the blast furnace was used. In some cases it might be found that the increased production and cheap melting in the cupola would make this combination desirable for open-hearth plants.

In electric furnace practice the successful starting up of the two 40-ton Heroult furnaces in the government armor plate plant is the outstanding feature of the year. These furnaces have a shell 18 feet in diameter and 8 feet high and the walls are lined 18 inches thick. Each unit is provided with three electrodes each 24 inches thick in the case of amorphous carbon, and 14 inches in diameter when graphite is used.

The furnaces are used to refine hot metal from two 75-ton basic, open-hearth furnaces in which the steel is brought to a phosphorus content of about .015 per cent. The phosphorus in the finished electric steel is slightly higher than this on acount of re-phosphorizing in the electric furnace. The sulphur is reduced in the electric furnace to between .008 and .015 per cent and the steel, of course, is thoroughly deoxidized. Thus the plant is able to pour a single ingot weighing 80 tons made from steel of a quality as high or higher than that of the best crucible steel. When it is considered that 15 years ago steel of such high quality was obtainable only in comparatively small ingots, we see what an enormous advance has been scored in the production of high quality steel in the last few years.

We are told that the problems encountered in building the 40-ton furnaces were more difficult of solution than those that will be met in building still larger units, and that the 100-ton electric furnace is at least in sight.

The General Electric Co. is developing a new type of induction furnace in which the primary windings are placed above the bath instead of on a level with it so that they are out of the way of a possible break-out. There are several special features in the design of the 2-ton furnace which is being tried out in practice. As the furnace necessarily operates on low-frequency power, a motor generator set is installed to convert the three-phase current to single-phase power of low frequency. In view of the several

unsuccessful attempts to develop the induction furnace on a practical scale in this country, and the great difficulties that have been encountered in making a bottom for the crucible which would "stay put", the progress of the experiments with this furnace will be watched with considerable interest.

During the year a paper was published giving the results of an interesting investigation made in Germany into the effect of silicon in basic, open-hearth steel. According to this investigator, the time at which the ferrosilicon is added in the ladle has a great influence on the loss of silicon and on the percentage of CO in the gases evolved in the ingots and therefore on the number and location of the blow holes. The conclusion reached is that the silicon should be added quite late in the filling of the ladle.

Another paper from Germany describes an experience on a practical scale with the burning of oil in a cupola to replace part of the coke. The object of this trial appears to have been rather a saving in coke than a reduction in the sulphur content of the melted metal. A bed of coke and a small charge of coke between successive lots of iron were used as in ordinary melting practice. The oil burners were introduced into the tuyeres and the flame blown against the incandescent mass of coke. Apparently the practice followed is similar to that of the Stoughton process in this country, and the results appear to correspond.

Foundry Research Productive in 1921

BY H. E. DILLER

METALLURGICAL developments in the casting industry during the past year have been mainly along the line of utilizing the results of past work rather than gain from present research or development. However, a research of vital interest to the foundry industry has been started by the joint effort of the American Foundrymen's association and the National Research council, which are investigating the sources and application of natural sands and the possibilities of synthetic sands in the foundry. As a start a summary of the literature dealing with molding sand in recent years has been prepared.

Several new developments in furnace construction have been inaugurated in the plant of the American Chain Co., York, Pa., which was started in operation about the middle of the year, and is described in THE IRON TRADE REVIEW of Oct. 13. Possibly the most radical of these developments is the car-type annealing furnace in which the castings are packed in cars which are pushed into the oven and drawn out as soon after the anneal as the castings are below the recalescent point, to enable another car to be put in the oven while it is hot. This method of handling castings in the anneal has been tried before but has not previously proved a success, mainly due to the mechanical details of handling the cars. In the latest installation the cars are handled by huge basket crane. The castings are packed in sand, this being a step away from the idea that an oxidizing packing is necessary. A new arrangement of the melting furnace allows the slag which is skimmed off during the heat to be dropped through a chute to the basement, thus avoiding the excessive heat to which the furnacemen are subjected when the slag is pulled out of the furnace and allowed to drop on the floor.

Past work in the development of malleable iron has crystallized in the increase of the physical requirements for their product made by the American Malleable Castings association. The minimum requirement for tensile strength has been raised from 45,000 to 50,000 pounds per square inch, and the elongation in 2 inches from 7.5 to 10.0 per cent. This indicates that the malleable iron of today is a far different product than it was a few years ago, due mainly to the use of steel in the mixture and increased care in melting and annealing, made possible by the almost universal use of the pyrometer in annealing ovens. Specifications for chilled-iron car wheels have been revised by the American Society for Testing Materials to include limits for composition, holding the manufacturer to closer work than the previous specifications. This move is in line with what some railroads were already doing and had found practical.

The electric furnace for gray-iron castings, and heat treating steel castings by methods other than annealing, two of the developments which are comparatively new in the foundry industry, made some progress during the past year. Considerable interest was aroused by George K. Elliot's paper before the Institution of British Foundrymen and the discussion brought out the British view of the use of electric furnaces for castings. In some points these were conflicting to the ideas of many Americans who have had experience with the electric furnace, and so served to bring forth many interesting points.

Another subject which has been brought into prominence during the past year is the possibility of improving the product of the cupola by a study and regulation of the slag. This seems to offer some prospects not previously considered.

The low tonnage of iron melted during the year caused a number of foundries to install smaller cupolas to minimize the use of coke. When operations increase these cupolas will be available for experimental work which no doubt will be carried on when better business makes funds more available.

The author is metallurgical editor of *The Foundry*, Cleveland.

Improve Equipment Despite Lull

Manufacturers of Iron and Steelworks, Rolling Mill and Foundry Equipment Make Notable Additions to Existing Production Facilities—Plant Owners Expend Large Sums in Seeking Operating Efficiency

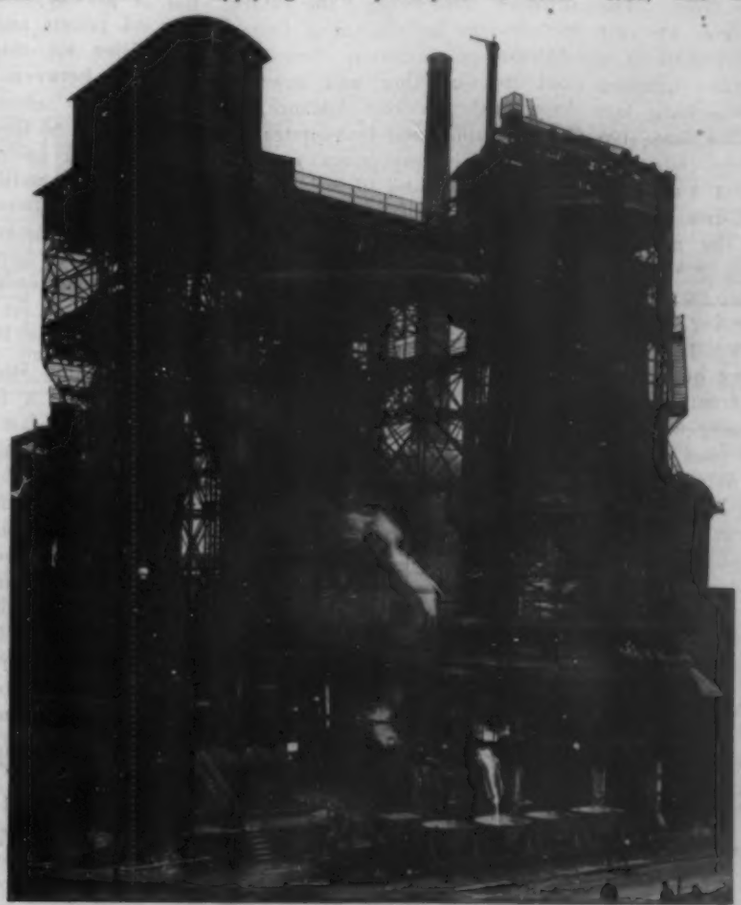
BY E. L. SHANER

ALTHOUGH the dawn of 1922 finds the world attempting to repudiate the slogan, "In time of peace prepare for war," that once popular phrase still may be aptly applied to business. By substituting "inactivity" for "peace" and "competition" for "war," we coin a watchword that is singularly appropriate to the present state of industry. The manufacturer who had the vision and courage to put his house in order during the slack period of 1921 is the one who is most likely to reap a full measure of reward when the world gets back to business.

This is especially true in the iron and steel industry, and it is gratifying to know that many producers in this field have made and are continuing to make extensive preparations for the inevitable conflict of competition. While they are not expanding their production capacities to anywhere near the point commensurate with normal requirements, they are remodeling and improving old equipment and installing needed auxiliaries at a rate seldom if ever equaled even in years of profitable business. A careful analysis of the iron and steelmaking, rolling, casting and fabricating equipment contemplated, built or under construction in 1921 emphasizes this fact in a striking manner. Although only one new blast furnace was built during the year, extensive repairs, in some cases equivalent to rebuilding, were made or are being made to more than a score of stacks. The same condition holds true in the case of much of the steel melting equipment in the industry. While the number of new open-hearth furnaces is small, many companies are increasing the efficiency of existing melting units by adding new gas producers, replacing obsolete charging machines with modern equipment, overhauling soaking pits, etc.

However, in spite of the limited amount of new construction, manufacturers of furnace and mill equipment have found opportunities to incorporate a great number of novel ideas in new designs. The tendency toward departures from the conventional is especially marked in the new electric furnaces and rolling mills developed during the year. Electrical engineers have been particularly active in applying new principles to steelworks equipment. Important strides have been made in the development of melting and annealing furnaces for the foundry industry, while the status of material handling apparatus has been advanced during the year. Perhaps it is safe to say that in general the new equipment installed in the iron and steel and allied industries in 1921 reflects a degree of refinement surpassing that of any previous year. Moreover the work under way at the present time seems to justify the prediction that 1922 will witness the contribution of an impressive array of notable achievements in the development of iron and steel works equipment.

In reviewing the progress made in 1921, one cannot help but be impressed with the extraordinary attention given to apparatus for handling and treating raw materials. The Babbitt plant for handling low grade Superior ores, the successful application of new equipment to the concentrating of Jersey ores, the equipping of several limestone properties with modern quarrying and conveying apparatus and the modernization of one or two fluorspar mines indicate that iron and steelmakers are determined to offset high freight rates as far as possible by inaugurating greater efficiency in preparing raw materials for use. Improved equipment played an important part in the iron making industry in 1921. Owing to the fact that only one new blast furnace was completed in the last 12 months, it is rather difficult to determine tendencies in design from actual installations. In many details the new



SHELL-LESS BLAST FURNACES AT A EUROPEAN PLANT. NOTE THAT THE FURNACE TOPS ARE SUPPORTED BY FRAMEWORK INDEPENDENT OF THE STACKS

Trumbull-Cliffs furnace reflects the ideas incorporated in the large stacks built in 1919 and 1920, and has several refinements which have not appeared in earlier units.

In accord with the growing conviction among furnacemen that coke should be screened at the furnace bins, the Trumbull stack has been provided with two rotary grizzly screens, each having eight motor driven shafts. These shafts carry disks, and the shafts and disks are spaced so that the rotary grizzly removes material under ¾-inch in size. The flow of coke from the bin to the grizzly is controlled by a cut-off gate and also by a rotary vane feeder. This provides a steady and even flow of coke over the screen. In case of emergency the coke can be by-passed from the bin to the skiphoist bucket, thus avoiding the grizzly.

The arrangement of the cast house again reflects the tendency shown in other recent furnaces of grouping the facilities for various operations so that they can be controlled from a central point. The steam cylinders for operating the shutters in the iron runners, the snort valve wheel, the mud gun and the signal apparatus all are controlled from a station at the furnace front. The stack also can be rodded from the cast house. Another important feature is a four-motor, traveling crane equipped with a 25-ton capacity main hoist and a 5-ton auxiliary hoist. This crane not only serves the cast house, but also extends over the hot metal track and another track for spotting cars of coke breeze, clay and sand. The crane is used in loading scrap and rubbish on cars or trucks for removal, for unloading materials, and for serving the slag granulating pit. The runway of the crane extends from the foot of the cast house up to the furnace front.

Better facilities for gaining access to out-of-way places in the blast furnace plant are being provided. Wherever possible bridges are used in order to reduce the number of stairways required. A few years ago a passenger elevator in a furnace plant probably would have elicited the disdain of the average furnaceman, but today an electric elevator with push-button control is considered almost standard equipment on new furnaces.

Use Hearth of Increased Diameter

The tendency toward steeper bosh angles, which persisted to a marked degree in 1920, is noticeable in the stacks rebuilt or relined during the past year. Perhaps the most radical example of this trend of design is the furnace having a hearth diameter of 20 feet 6 inches and a bosh of 22 feet. The rebuilt No. 2 furnace of the Empire Steel & Iron Co. has a bosh angle of 78 degrees, and the hearth of No. 1 stack of the Alabama Co. at Gadsden was increased so as to give a bosh angle of 77 degrees 42 minutes in place of the pre-existing angle of 74 degrees.

However, not all furnace engineers and operators subscribe to the theory that the steeper bosh angle is desirable. The new 600-ton stack of the Trumbull-Cliffs Iron Co. has a hearth of only 18 feet in diameter and a bosh 22 feet 6 inches in diameter. In remodeling "A" furnace, the engineers of the Low Moor Iron Co. of Virginia had a good opportunity to increase the slope of the bosh walls but in view of their successful experience with a flat-angle bosh, they decided to leave it unaltered at 74 degrees 53 minutes. This was accomplished by reducing the diameter of the bosh, retaining the existing hearth dimensions and lowering the bosh line.

Rehabilitate Many Old Stocks

An unusually large number of eastern and southeastern furnaces are being modernized to conform with the requirements of economical operation. In most cases the work not only involves remodeling the stack, but includes the installation of better stock distributing facilities, new skiphoist, and gas cleaning and ore handling apparatus. In one instance, a blast furnace superintendent states that by virtue of improvements made in the design, lines and distribution of the stack, the installation of a pig casting machine, the building of a new storage trestle and the introduction of two locomotive cranes, the company has been able to reduce the labor force required to operate two furnaces from 305 to 160 men. In view of present business conditions it is probable that 1922 will witness an extensive campaign for the rehabilitation of old furnace plants rather than a marked increase in the number of new stacks built.

The treatment of gas has received much attention from equipment engineers. While the status of the dry and wet methods of cleaning have remained practically unchanged during the year, investigations constantly are being made in order to improve the existing apparatus. A new electrostatic process for rough cleaning blast furnace gas is being tried out in an English furnace. It is said to resemble the Cottrell process. The cleaned gas is suitable for stoves but contains too high a percentage of dust to be used in gas engines.

A number of refinements have been added to the electrical precipitation plants operating on the ferromanganese furnaces at Sheridan and Dunbar, Pa., The smaller units are far more satisfactory than the larger ones first installed. The precipitator at Sheridan has been operating continuously and collects approximately 5000 pounds of dust per day from about one-half of the gas output of a 250-ton furnace.

Seek Economies in Sintering Plants

With keen competition looming as one of the greatest coming forces in industry a number of large iron and steel companies are seeking economy through a more efficient recovery of flue dust. Perhaps the most important example of this tendency is the sintering plant recently completed for the Cambria Steel Co. The equipment is designed to handle 1000 tons of material daily. Flue dust from stock pile or direct from the furnace, mill scale, or ore can be treated, the daily output of sinter being about 800 tons. Two of the large size Dwight & Lloyd type machines, each with an effective grate area 42 inches wide and 57 feet 4 inches long, have been installed. The usual length of the machines made it necessary to abandon the use of a gravity return for the lower strand of pallets and to introduce a positive drive for this purpose. Sliding friction between the pallets and the wind box is eliminated by carrying the weight of the loaded pallets on wheels running on rails. Seal bars are used to automatically maintain air-tight joints between the pallets and the tops of the wind boxes. The unloading apparatus and the storage bins are of sufficient capacity to allow 24-hour operation of the sintering machines with only 10-hour unloading time.

Making steel direct from ore always has been a fascinating subject, and despite the fact that not one of the more than 70 socalled "direct processes" has been established on a commercial basis, more than usual interest in the problem was manifested in 1921. Several processes involving certain modifications of the rotary kiln equipment, which figured prominently in early attempts to make steel from ore, were announced during the year, but thus far no opportunity has been given to test the claims of the inventors.

In a number of cases the electric smelting of iron has been reduced to a commercial possibility, and it is probable that the use of electric blast furnaces will be extended in certain localities where the conditions for their operation are more favorable. The Swedish "Electrometall" process has proved successful for the production of low silicon iron, more than 27 units with a total capacity of about 100,000

kilowatts being in operation or under construction.

Many steelmakers hold to the opinion that a "step" process of steelmaking is more feasible than any of the "direct" processes yet suggested. Frank Hodson president of the Electric Furnace Construction Co., Philadelphia, believes that the future method of making steel will be to pour hot metal from either the electric or standard blast furnace into a large metal mixer where additions of ore, cheap borings and turnings could be made. The metal would be delivered from the mixer to a bessemer converter where it would be given a partial blow, after which it would be deoxidized and finished off in a series of electric furnaces.

Numerous methods have been proposed for smelting the iron sands found on the Pacific coast and in certain other parts of the world. A process developed by A. E. Bourcoud, consulting engineer, New York, involves a rotary furnace for preheating the ore, a rotary reducing furnace with internal spiral baffles, a machine for compressing the sponge produced by the reducing furnace, a primary electric furnace for continuously melting the compressed sponge and gangue, and secondary electric furnaces for refining and finishing the metal. This process was described in detail in the Aug. 11 issue of THE IRON TRADE REVIEW.

United States patent No. 200463 covers a method of smelting invented by Messrs. Greaves and Etchells. The equipment involved consists of a rotating tube furnace feeding directly into one or two electric arc furnaces. The ores are mixed with carbon or hydrocarbons and are fed gradually and regularly into the electric furnaces. The carbonic oxide gases given off in the smelting are utilized to effect a preliminary heating and partial reduction. The product of the rotating furnace is an iron sponge in a fine state of division, which is claimed can be easily refined in the electric furnace.

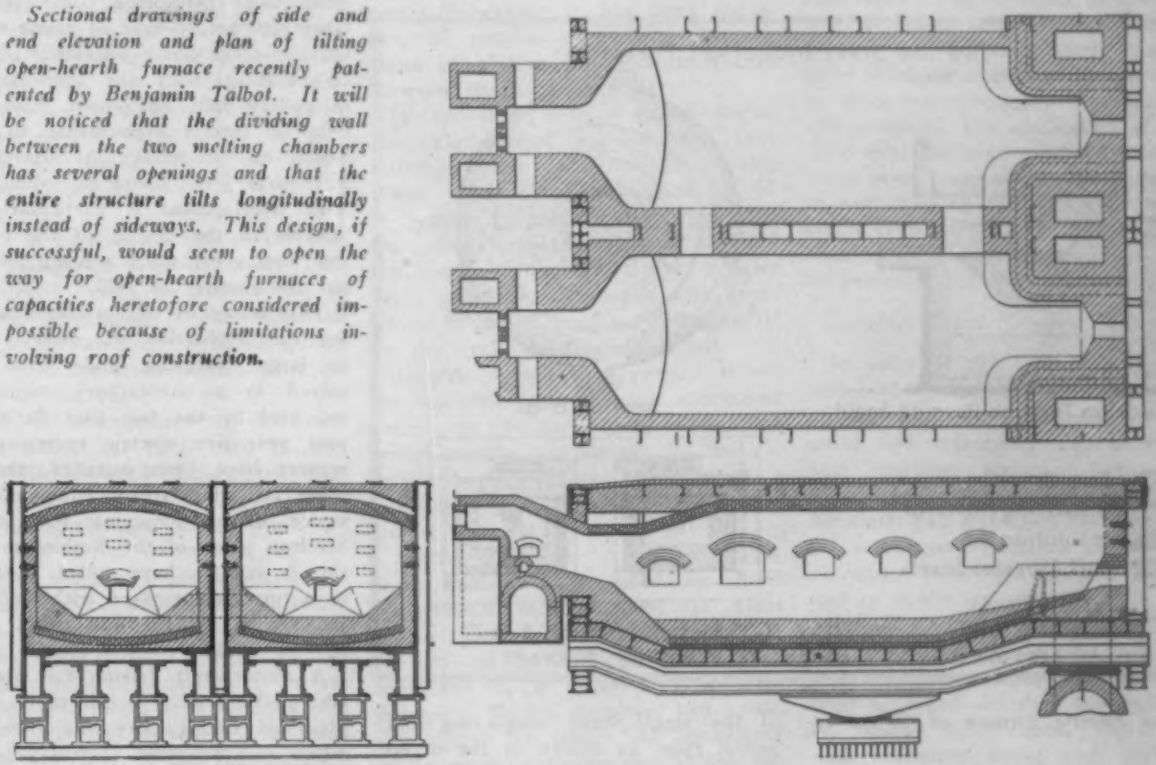
Modify Design of Ports

The outstanding development in steelmaking during the past year has been the change in the design of open-hearth ports as specified in the McKune and Egler systems and as practiced in the venturi-line furnace. However, the improvement in the efficiency of combustion resulting from these changes is derived more from a modification of the method of operating open-hearth furnaces than from benefits directly traceable to new equipment. As a matter of fact the only new equipment required consists of certain valves, burners, dampers and fittings, the other changes involving only slight modifications of the furnace proper.

Of the 13 new open-hearth furnaces completed during 1921, five have capacities of 100 tons each, two of 60 tons each, two of 50 tons, and four of 40 tons. The four under construction at the end of the year will be rated at 100 tons each. While definite conclusions cannot be drawn from these figures, because the new construction is not typical of a normal year's expansion in melting capacity, it is barely possible that the preponderance of 100-ton units foreshadows a trend toward furnaces of larger capacity. In the past decade the growth of the duplexing process has been responsible for many of the open hearths of over 60-ton capacity installed in American steel works.

An attempt to work out a suitable design for an unusually large furnace is seen in the recent United States patent issued to Benjamin Talbot for a twin-hearth, tilting furnace. As shown in the accompanying drawings, the design is unusual in that the furnace structure tilts longitudinally instead of sideways and in that the problem of supporting a roof for such a large unit is met by providing for

Sectional drawings of side and end elevation and plan of tilting open-hearth furnace recently patented by Benjamin Talbot. It will be noticed that the dividing wall between the two melting chambers has several openings and that the ***entire structure tilts longitudinally*** *instead of sideways. This design, if successful, would seem to open the way for open-hearth furnaces of capacities heretofore considered impossible because of limitations involving roof construction.*



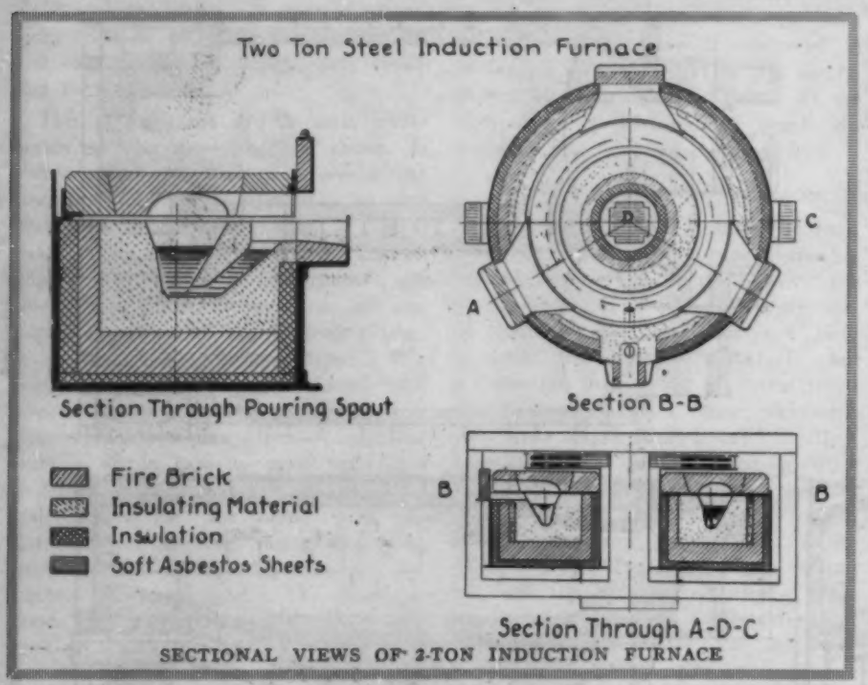
two parallel melting chambers separated by a wall. It is estimated that a furnace of this type, if successful, would justify a rating of 500 tons.

Comparatively few new electric furnaces were installed in steel plants in 1921, yet the year witnessed a number of important achievements in the design and construction of electric melting equipment. Although the two 40-ton units built for the government armor plate plant presented many usual problems because of their size, electric furnace engineers are striving for still larger furnaces. The Ford Motor Co. already has placed an order for an electric furnace of 60-ton capacity.

The iron and steel industry owes much to electrical engineers for their efforts to improve the efficiency of electric melting equipment. The Association of Iron and Steel Electrical Engineers has been active in studying the problem of reducing heat losses in formulating specifications for electrodes, and in investigating the advantages of dual voltages. The manufacturers of an English furnace have developed an economizer for reducing the heat losses at the opening between the roof and electrodes. It consists of a series of telescoping tubes encircling the electrodes above the roof and is said to be effective against escaping gases.

Sentiment favoring the use of dual voltages seems to be stronger than heretofore. The members of a committee investigating this subject recommend voltages of from 120 to 140 for melting and of 70 to 80 for refining in a 3-phase, 6-ton Heroult furnace. It is claimed that, providing the melting voltage is not too high, as good steel can be made by using dual voltages as with one voltage. Moreover, economies are effected through lower power consumption and increased life of refractories.

Because of the difficulties which have attended previous attempts to produce high grade steel in induction furnaces, the unusual results being obtained on a 2-ton basic unit at the Pittsfield plant of the General Electric Co. are attracting considerable attention. The furnace is of the single-phase, single-ring, horizontal type, as shown in the accompanying drawing. The laminated core is tree-legged and has a removable top yoke. The annular steel casing of the hearth surrounds the middle leg of the core and the hearth is circular, with a vertical section approximately V-shaped. Crews of three men, each, working in shifts, operate the furnace continuously 24 hours a day and seven days a week throughout the life of the lining.



SECTIONAL VIEWS OF 2-TON INDUCTION FURNACE

By the use of a recently developed refractory a number of remarkable endurance records have been made. On a 93-day run completed only a short time ago 604 consecutive heats were made, the previous lining having withstood 555 heats in 86 days. The furnace has been operated for more than a year, having melted about 2300 tons of metal in that time. It has been used almost exclusively for reclaiming sheet steel scrap.

The new refractory is highly basic, and with a tar or pitch binder, is rammed into place, forming a hard lining having a low coefficient of expansion. Another feature of the furnace is that the winding is placed above the bath so that it cannot be destroyed in case the metal should break through the crucible.

Motors For Reversing Drives

During the past year the progress in the development of rolling mill equipment has followed two distinct lines of effort. On one hand, engineers have applied electric drives to a number of mills on which engines were heretofore considered the most satisfactory type of prime mover. On the other hand, operating officials, co-operating with the manufacturers of rolling mill equipment, have contributed certain refinements to mills which aid materially in overcoming a number of operating difficulties. This development is particularly noticeable in the design of the numerous new sheet mills erected throughout the country in 1921.

That many of the problems attending the application of electric drives to large reversing mills have been solved in a satisfactory manner is indicated by the fact that during the past year five electric reversing mill motors have been installed, three of them replacing steam equipment. A motor driven blooming mill at the Steelton plant of the Bethlehem Steel Co. is said to have rolled 1520 tons on a turn as compared with 1046 tons, the record for the mill when driven by an engine.

A motor unit driving the first finishing stand of the rail mills at the plant of the Lackawanna Steel Co., which was delivered several years ago but not installed until 1921, has the distinction of having the highest continuous horsepower capacity of any electric reversing drive in the world. The motor originally was designed to roll the first four of the last five passes on a rail section, the last pass being rolled on another separately driven mill. The ability of motor equipment to handle overloads is well illustrated by the fact that this reversing motor has not only performed satisfactorily when driving the first finishing stand, but has been connected to the last stand, and when driving both stands and rolling all five passes, has established a new tonnage record.

Discuss Frequency Problem

During the year there has been more than usual discussion on the growing problem of standardizing the frequency of steel mill equipment.

In view of the expenditures represented by existing 25 and 60-cycle apparatus it is not surprising that a solution of the problem seems as far away as ever. The Tennessee Coal, Iron & Railroad Co. is attacking this difficulty by constructing a 7000-kilovolt-ampere frequency changer. It will tie a 25-cycle plant to a 60-cycle turbine operating in conjunction with purchased power.

That the tendency toward installing labor-saving equipment is as strong if not stronger than ever is emphasized throughout the rolling mill industry by the number of mechanically operated devices which are appearing. In order to eliminate the difficulties often caused by attempting to force a bent bar through the guides of a merchant mill, the Central Steel Co. is using a guide box having quick opening guides. One guide is stationary but the other is adjustable and by simply throwing a lever the guides may be thrown apart far enough to receive the end of the bar, even though it may be badly bent or battered. As soon as the end of the bar is gripped in the rolls the lever is thrown over and the guides firmly hold the stock in line with the center of the pass.

A novel arrangement of drive for runout tables has been used in several mills installed during the past year. The usual practice is to drive these tables through gearing from the main roll drive. However, in the new plan the tables are driven by individual motors and in one case the motor equipment consists of 93 one-half horsepower units.

Another new development is the application of a motor to a reel for cold rolled strip steel, making it possible for the operator to use and maintain any tension desired.

Change Sheet Mill Design

Sheet mill operators who are familiar with the equipment in general use about five years ago undoubtedly are surprised and gratified when recounting the changes that have been introduced in the past 12 months. In a number of new sheet mills the motors driving the hot rolls run at 300 revolutions per minute instead of 240. It is claimed that the higher speed is conducive to greater efficiency and a higher power factor.

In some cases even the arrangement of the mills has been altered. At the new plant of the Superior Sheet Steel Co. the eight hot mills are divided into two groups of four mills, each being driven through 10 to 1 reduction gears by a 1000-horsepower mill-type motor. Two stands of cold rolls are coupled to one end and one stand to the other of each hot mill train. This represents a radical departure from the usual practice of driving eight or 10 hot mills in train from one motor and four or more cold mills in another train from a second motor.

Design Balanced Roll Drives

However the most striking change in sheet mill design lies in the new methods being employed to drive the upper rolls. In the past the top rolls, with the exception of those on roughing or jobbing mills, have derived their motion solely from friction. Whenever it has been necessary to provide a positive drive, a stand of pinions has been interposed between the jobbing mills.

In the new mills installed during the year several devices have been introduced to eliminate the pinion stand. In the mills designed by H. A. Roemer for the Superior Sheet Steel Co. gears fastened to either neck of the lower roll actuate a set of idler gears which in turn mesh with gears which fit freely over tapered journals on the necks of the upper roll. An adjustable clutch arrangement drives the top roll from the last mentioned gears, the pressure being such that under normal conditions the roll is driven by the gears. In case of a jam, the clutch slips, thereby protecting the rolls from injury.

Another balanced drive for upper sheet mill rolls, designed by Josef Hirschmann, is in use at the plant of the Eastern Rolling Mill Co. It consists of a 25-horsepower motor connected to a reducing gear train through a flexible coupling, and a slip ring clutch by which the movement of the gears is transmitted to the top roll. Still another type of balanced drive, similar in principle, has been installed at the plant of the Milwaukee Rolling Mill Co. Provision has been made in each of these devices for flexibility in the driving train so that it is not affected by the vertical adjustment of the upper roll for rolling different gages.

A large number of by-product coke ovens have been built during the year and are either under construction or contemplated for the future. In several plants, particularly two of the Cambria Steel Co., extensive alterations are being made to existing equipment with a view of increasing economy.

Interest is centered upon the performance of eight experimental Piette coke ovens installed at the plant of the Laclede Gas Light Co., St. Louis, by the Franco-Belgian Coke Oven Corp. of Brussels. Numerous ovens of this type have been built and are in operation in Europe but this is the first installation in the United States. The oven is of the regenerative by-product type with vertical flues. Its regenerators operate at right angles to the axis of the ovens, a reversing device acting to change the direction of the burning air and gas in the flues. A straight line divides the battery into two symmetrical parts and the current of gas and air acts alternately in reverse direction in each half.

The manufacturers of heating furnaces have been particularly alert during the past year to adopt as many improvements as possible in their equipment. The efficiency of coal, gas and oil firing furnaces has been increased by various methods, particularly by closer control of the heat and by more extensive use of the regenerative principle. The application of electrical heat has been extended to enameling ovens, core ovens and a number of heat treating furnaces with considerable success. It is believed that electrically heated soaking pits will be perfected within a short time.

Introduce Novel Foundry Equipment

In spite of the severe setback experienced by the casting industry during the past year, a notable array of novel and interesting equipment has been installed, some of which furnishes ample proof that the manufacturers and engineers in this field are no longer restrained by the conservatism formerly ascribed to the leaders of the industry.

The new foundry of the Ford Motor Co., at River Rouge, is attracting much attention because the equipment has been arranged so that castings may be poured with cupola iron mixed with hot metal direct from the blast furnace. The capacity of the plant when completed will be 2500 tons of castings daily, the metal being supplied by the blast furnaces and 24 78-inch cupolas lined to 60 inches. Thus far the proportions of metal in the mix have varied from 40 per cent direct and 60 per cent cupola to 80 per cent direct and 20 per cent cupola. It is expected that a 50-50 proportion will be used for average work.

With the exception of the melting equipment and molding machines most of the apparatus is of special design. Coke and limestone is brought to bins above the charging floor on continuous conveyors and is delivered to each cupola through twin chutes. The metal from the cupolas and blast furnace is poured into 20-ton mixing ladles. The mixed metal is drawn off into 1-ton ladles suspended on trolleys for pouring. The molds are placed on

slowly moving conveyors and are poured when they arrive at stations the cupola side of the building. The molds then are conveyed back to the opposite side of the foundry to shake-out stations. Naturally in a plant of this type and size, the sand handling equipment is extensive.

Equipment embodying radical departures from usual design appear in the new malleable iron foundry of the American Chain Co., York, Pa. Pig iron and scrap are brought to the melting furnace by a telpher crane and the castings are conveyed through the molding department to the hard-iron room, the annealing department and the soft-iron cleaning room by a light overhead trolley in conjunction with chutes and conveyors. The usual troublesome problem of disposing of slag from the melting furnace is simplified by skimming it into a chute which carries it out of the way of the furnace tenders. The hard castings are packed in sand in pots which are placed on cars. After the pots on a car are filled and luted, the car is pushed onto a 100-ton basket-type transfer crane and carried to the track in front of the annealing oven. The principal advantage gained by this application of the car-type oven to annealing operations is that a car of annealed castings can be removed before entirely cooled and another pushed in, thereby conserving the residual heat in the walls and roof of the furnace.

Progress is being made in developing centrifugal casting in spite of the fact that infringement suits and other litigation have tended to slow up certain research work. Thus far the most definite results have been obtained with nonferrous metals, but there are indications that centrifugally cast steel soon will be established on a sound commercial basis.

Great strides have been made during the year in the development of material handling equipment. The tendency toward the more widespread use of small industrial cranes, which was first noticeable in 1920, now is clearly defined, and a varied assortment of types is being offered to prospective users. The principle of the well known locomotive crane which travels under its own power on railroad tracks, has been applied to revolving cranes mounted on caterpillar, railroad or automobile trucks, while the lifting and propelling power is furnished by a steam or gasoline engine or an electric motor. The tendency toward the employment of internal combustion engines and electric motors has been especially marked during the past year.

ARRANGEMENT OF THE MOTORS, DRUM AND AUXILIARY EQUIPMENT ON TROLLEY OF 75 TON CRANE FOR HANDLING 16-INCH GUN FORGINGS AT THE RECENTLY COMPLETED GOVERNMENT ORDNANCE PLANT AT SOUTH CHARLESTON, W. VA.

Progress in the design of traveling overhead cranes during the past few years has been largely confined to refinements in control and the development of safety devices. The partial completion in 1921 of the heat treating department of the government ordnance plant at Charletown, W. Va., presented an unusual problem in crane design. The length of large gun forgings, which are handled in a vertical position in the heating and quenching operations, necessitated an unusually high runway, a long lift, comparatively high hoisting and lowering speeds, and accurate and positive control. The crane which was built to the navy's specifications for this purpose therefore embodies a number of new features. It has a span of 104 feet, a lift of 165 feet and a capacity of 75 tons. Its five motors have an aggregate rating of 550 horsepower. The dispatch with which the crane can handle 16-inch gun forgings to and from the quenching tanks is indicated by the hoisting and lowering speeds, which are 55 and 110 feet per minute, respectively.

Builds Novel Cranes

Traveling cranes built to run on a circular track are not new, but an adaptation of the idea, embodied in at least one installation during the past year, is novel and interesting. The crane in question is pivoted at one end, while the other traverses a circular runway.

A far more radical departure from conventional crane design comes from Germany, where a manufacturer has developed swivel trucks for gantry and revolving cranes so that they may be shifted from one track to another. The principal merit of this scheme is that a gantry or derrick of small span or lifting radius can be used in place of a bridge of long span or a revolving crane with long boom. The shifting gear of these new cranes consists of a series of jacks, by which the entire structure is lifted so that the wheels clear the rail, and four swivel trucks which enable the crane to move in a direction 90 degrees with the runway. With this type of equipment a large stockyard can be served by a comparatively small crane operating on a number of parallel tracks.

Improve Small Handling Devices

In spite of the depression experienced during most of 1921, more than usual attention was paid to small handling devices, including industrial tractors for interior transportation, lift trucks, and telpher systems. A form of the latter, in which trolleys carrying hoists run on an overhead monorail or tramrail, has been developed so that units may be operated on any floor of a building. The elevators, switches, crossovers, etc., as well as the various forms of hoisting and carrying devices used with an installation of this equipment provide a flexible system occupying little if any floor area that could be utilized for any other purpose.

During the year, the recently organized materials handling section of the American Society of Mechanical Engineers has developed an extensive plan for collecting information regarding handling problems and for enlisting the co-operation of manufacturers in improving the status of the engineering of material handling. The influence of this work, which soon will be reflected in new standards, specifications, etc., undoubtedly will help to co-ordinate and solve many of the problems now confronted by the manufacturers of handling apparatus.

Business Status Halts Expansion

Yield of New Steelmaking Facilities Completed Last Year Is the Smallest Since 1914—Growth of Blast Furnace Capacity Is Stunted—Resume of Iron and Steel Works Building Programs During 1921 and for 1922

BY JOHN D. KNOX

NEW steelmaking and rolling mill capacity during 1922 will be governed largely by financial conditions and requirements of the industry. With steel manufacturers exhausting every effort to maintain partial operation of their steel plants at present, little consideration is being given to plant extension.

A year ago, at the beginning of 1921, open-hearth furnaces under way promised 665,000 tons additional to the country's steelmaking capacity. The number of steel melting units building on Jan. 1, 1920 was 25, having a total rated capacity of 1,392,000 tons annually. At the beginning of 1919, 12 open hearths with a total yield of 1,005,000 tons were included in the building program while at the opening of 1918 construction work had been started on 27 furnaces of 1,530,000 tons capacity. On Jan. 1, 1917 the number of furnaces in course of erection totaled 95 and promised 4,795,500 tons to the total ingot capacity. The number of open-hearth furnaces and how their gross tonnages have increased the estimated national ingot capacity may be compared in the following table:

Year	Number of furnaces	Gross tons	National ingot cap.
1921	13	620,000	54,120,000
1920	26	1,268,000	53,500,000
1919	23	1,871,000	52,200,000
1918	39	2,192,500	50,500,000
1917	102	5,413,000	48,500,000
1916	105	4,300,000	43,000,000
1915	43	1,759,000	39,000,000
1914	9	507,000	57,500,000
1913	62	3,120,000	37,000,000

Increased Capacity in 1921

Table II shows the details by companies, the number of furnaces built, and the increased steel-ingot capacity for 1921. The increase in open-hearth steel represents a total of 13 furnaces which began melting for the first time and netted the industry 620,000 tons. Compared with statistics over the past nine years, as shown in the foregoing table, open-hearth expansion in 1921 was the lowest both from the standpoint of the number of units and the aggregate tonnage since 1914, when only nine furnaces were built with a yield of 507,000 gross tons annually. The abnormal demand for steel during the war period, however, largely was responsible for the good showing in steelworks construction from 1915 to 1918, inclusive, and it is doubtful whether future building programs under ordinary conditions will ever equal that rate of expansion. Compared with 1920, when 26 new open hearths with an aggregate output of 1,268,000 tons annually were charged, the coming capacity for 1921 was 648,000 tons less, with a reduction of 13 units. The decline in the tonnage offered by the new units laid down since 1917 is a natural aftermath to the period when demand necessitated heavy construction work.

Table I

Recapitulation

	1921 Completed	1921 Building
BY-PRODUCT OVENS	283	100
BLAST FURNACES	1	0
OPEN HEARTHS	13	4
ROLLING MILLS		
Band	1	0
Bar	2	0
Billet	4	0
Billet and sheet bar	2	0
Black plate	10	1
Blooming	1	1
Hoop	1	0
Merchant	8	2
Plate	1	0
Rail	0	1
Rod	0	1
Sheet, hot	59	22
Sheet, cold	44	4
Sheet and tin bar	2	1
Skelp	2	0
Strip, hot	2	4
Strip, cold	41	10
Tube, buttweld	0	2
Tube, lapweld	2	0
Tube, seamless	1	0
Universal	0	1
Wheel	2	0
Total	185	50
ELECTRIC FURNACES		
Greaves-Etchells	2	0
Greene	0	3
Heroult	9	1
Unclassified	1	2
Total	12	6

Completion of 620,000 tons of added open-hearth output in 1921 brings the estimated total steel capacity of the United States to 54,088,000 tons. Prospects for growth during 1922 are not as promising as former years. Only four furnaces are scheduled for completion this year and these would have been ready for operation during 1921 had not business conditions become unsettled. This compares with a building program on Jan. 1, 1921 of eight units of 465,000-ton capacity. At the opening of 1920 construction work had begun on 25 furnaces of 1,392,000-tons capacity. At the beginning of 1919 there were 12 furnaces in the process of building with a combined output of 1,005,000 tons. On Jan. 1, 1918 there were 27 furnaces of 1,530,000-tons capacity being built and at the opening of 1917, 95 units with an annual output of 4,795,500 tons.

The annual steel output of the United States on Jan. 1, 1913 was estimated at 37,000,000 tons. New open-hearth furnaces built during the following two years increased the figures to 39,000,000 tons. With the new furnaces built during 1916, the national tonnage was augmented to 43,000,000 tons. During 1917 the completion of more than 5,000,000 tons capacity led to an estimate of 48,500,000 tons. New furnaces placed in action during 1918 afforded 2,000,000 tons and brought the estimate of the country's total ingot-producing capacity up to 50,500,000 tons. With the increased open-hearth capacity built during the past three years, the estimated ingot producing capacity of the country on Jan. 1, 1922, was 54,088,000 tons. On Jan. 1, 1914 the combined capacity of steelworks furnaces in the United States was estimated by THE IRON TRADE REVIEW as 37,000,000 tons. The increased ingot capacity during the eight-year period, therefore, is 17,120,000 tons, or 46 per cent.

As shown in Table VII, 283 by-product coke ovens were completed in 1921 having a combined coking capacity of 1,315,000 tons annually. During 1920, 1213 by-product ovens with an annual estimated capacity of 5,840,510 tons were completed. In 1919 new by-product coke output was 3,483,505 tons, representing 783 new ovens. The coking capacity added during last year, therefore, is 930 ovens, equivalent to 4,525,460 tons, less than the number of ovens available during 1920 and 500 ovens, equivalent to 2,168,450 tons, less than the number laid down during 1919.

By-Product Oven Operation

According to a summary presented in the *A B C of Iron and Steel* 11,396 by-product ovens were built in the United States May 1, 1921, of which 8164 ovens were operated by independent companies and 3232 by the subsidiary companies of the United States Steel Corp. With the 283 units completed during 1921 the actual number

of by-product coke ovens in America stands at 11,679, their annual coke yield approximating 45,213,080 tons.

In 1919 production figures show that the output of by-product coke in this country passed the output of beehive ovens by 5,493,542 net tons. During that year beehive ovens contributed 44 per cent and by-product ovens 56 per cent of the coke produced in the United States. Last year 20,980,000 net tons of coke, or 40 per cent of the national output, was made in beehive ovens and 30,908,000 net tons, or 60 per cent, in by-product ovens.

Coke Resources Abound

Coke and by-product resources in this country, therefore, are in the most favorable position since the establishment of both industries. During 1921 the Woodward Iron Co. rebuilt 60 by-product ovens at its Woodward, Ala. plant, while at the close of the year 224 by-product units were being rebuilt by the Illinois Steel Co., Joliet, Ill., and 30 by the Woodward Iron Co., Woodward, Ala.

As announced in the Nov. 24, 1921 issue of THE IRON TRADE REVIEW, the Carnegie Steel Co. expects to begin work on six additional batteries of by-product ovens at Clairton, Pa. With the addition of the 384 new ovens, the plant will have a total of 18 batteries, or 1152 ovens, with an annual coke capacity of 4,552,050 net tons. The original plan of the Clairton works called for 24 batteries of 64 ovens each. At the Josephine, Va. plant of the Intermont Coal & Iron Corp., 10 beehive coke ovens were under construction at the close of 1921. When completed the ovens will give this corporation 4800 additional tons annually.

Pig iron producing capacity built during 1921, as shown in Table IV, was confined to one stack which increased the national estimated pig iron capacity 207,000 tons annually. This a decline of 931,500 tons compared with the added capacity of 1920 made possible by the completion of six new stacks. Pig iron capacities in gross tons of all new stacks placed in blast each year from 1905 to 1921 inclusive, may be compared in the following table:

Year	Gross tons
1921	207,000
1920	1,138,500
1919	396,750
1918	1,425,000
1917	2,182,500
1916	530,000
1915	530,000
1914	None
1913	550,000
1912	1,000,000
1911	565,000
1910	1,794,000
1909	1,930,000
1908	1,188,000
1907	2,065,000
1906	1,135,000
1905	1,292,000

Two stacks were rebuilt completely during 1921, the No. 2 furnace of the Carnegie Steel Co., Farrell, Pa. and the Claire furnace of E. W. Mudge & Co., Sharpsville, Pa. Each was designed to smelt a larger tonnage of iron than the original units. Stacks which were remodeled last year, include the Emporium furnace of the Emporium Iron Co., Emporium, Pa., the No. 2 furnace of the Alabama Company, Gadsden, Ala., and "A" furnace of the Low Moor Iron Co., Low Moor, Va.

Many Furnaces Being Rebuilt

In addition to the new stack and the rebuilt and remodeled stacks, attention is attracted to the number of furnaces which either are being rebuilt along larger lines or are being altered to conform to economical practice. The list as shown in Table VI includes the No. 3 furnace of the Carnegie Steel Co., Duquesne, Pa.; the No. 5 furnace of the Carrie group of the Carnegie Steel Co., Rankin, Pa.; No. 4 furnace of the Lorain, O.,

Equipment Completed or Building in 1921

Table II

Open Hearths Completed During 1921

Company	No. of furnaces	Rated capacity tons	Annual capacity tons
Follansbee Brothers Co., Toronto, O..	4	40	120,000
Kansas City Bolt & Nut Co., Kansas City, Mo.	2	50	70,000
Naval Ordnance Factory, S. Charleston, W. Va.	2	60	80,000
Weirton Steel Co., Weirton, W. Va...	2	100	140,000
Worth Steel Co., Claymont, Del.....	3	100	210,000
	13		620,000

Table III

Open Hearths Building Dec. 31, 1921

Company	No. of furnaces	Rated capacity tons	Annual capacity tons
*Carnegie Steel Co., Youngstown, O..	3		
Mansfield Sheet & Tin Plate Co., Mansfield, O.	4	100	280,000

*Rebuilding.

Table IV

Blast Furnaces Completed During 1921

Company	No. of stacks	Daily capacity tons	Annual capacity tons
*Carnegie Steel Co., Farrell, Pa.....	1	500	172,500
*Claire Furnace Co., Sharpsville, Pa..	1	400	138,000
Trumbull-Cliffs Furnace Co., Warren, O.	1	600	207,000

Table V

Stacks Remodeled During 1921

Company	No. or name
Alabama Company, Gadsden, Ala.....	2
Emporium Iron Co., Emporium, Pa.....	Emporium
Low Moor Iron Co., Low Moor, Va.....	"A"
Total	3

Table VI

Stacks Being Remodeled Dec. 31, 1921

Company	No. or name
Carnegie Steel Co., Duquesne, Pa.....	3
Carnegie Steel Co., Rankin, Pa.....	5
National Tube Co., Lorain, O.....	4
National Tube Co., McKeesport, Pa.....	2
Northern Iron Co., Standish, N. Y.....	Standish
Tennessee Coal, Iron & Railroad Co., Ensley, Ala.	1
Wheeling Steel Corp., Martins Ferry, O.....	Martins Ferry
Wheeling Steel Corp., Steubenville, O.....	2
Total	8

Table VII

By-Product Ovens Completed in 1921

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Cambria Steel Co., Johnstown, Pa.....	88	S-S	456,100
Camden Coke Co., Camden, N. J.....	37	K	160,950
Chicago By-Product Coke Co., Chicago.	100	K	435,000
Laclede Gas Light Co., St. Louis.....	8	P	28,000
Milwaukee Coke & Gas Co., Milwaukee	50	K	235,000
*Woodward Iron Co., Woodward, Ala.	60	K	.....
Total	283		1,315,050

*Rebuilt.

Table VIII

Ovens Building Dec. 31, 1921

Company	Number of ovens	Type of ovens	Est. annual coking cap., tons
Milwaukee Coke & Gas Co., Milwaukee.	100	K	435,000
*Illinois Steel Co., Joliet, Ill.....	224	K	.....
*Woodward Iron Co., Woodward, Ala..	30	K	.....
Total	100		435,000

*Rebuilding.

Rolling Mills Completed or Building in 1921

Table IX

Rolling Mills Completed During 1921

Company	Number stands		Type mill
Acme Steel Goods Co., Riverdale, Ill.	20	10"	Cold strip
American Rolling Mill Co., Middletown, O.	4	30"	Sheet
American Rolling Mill Co., Zanesville, O.	4	30"	Sheet
American Rolling Mill Co., Zanesville, O.	2	30"	Cold rolls
American Tube & Stamping Co., Bridgeport, Conn.	1	18"	Hot strip
Carnegie Steel Co., McDonald, O..	1	10"	Hoop
Carnegie Steel Co., McDonald, O...	1	18"	Band
Cambria Steel Co., Johnstown, Pa..	2	..	Wheel
Central Steel Co., Massillon, O.....	1	12"	Merchant
Central Steel Co., Massillon, O....	1	18"	Merchant
Chapman Price Steel Co., Indianapolis, Ind.	4	28"	Sheet
Chapman Price Steel Co., Indianapolis, Ind.	2	24"	Cold rolls
Ewald Iron Co., Louisville, Ky....	1	8"	Bar
Follansbee Brothers Co., Toronto, O.	1	30"	Sheet bar
Follansbee Brothers Co., Toronto, O.	10	30"	Sheet
Follansbee Brothers Co., Toronto, O.	10	28"	Cold rolls
General Steel Co., St. Francis, Wis..	1	24"	Billet
General Steel Co., St. Francis, Wis..	1	10"	Merchant
Harrisburg Bar Mill Co., Harrisburg, Pa.	1	9"	Merchant
Harrisburg Bar Mill Co., Harrisburg, Pa.	1	12"	Merchant
Indiana Rolling Mill Co., New Castle, Ind.	8	28"	Sheet
Interstate Iron & Steel Co., So. Chicago, Ill.	1	12"	Merchant
Interstate Iron & Steel Co., So. Chicago, Ill.	1	14"	Merchant
Kansas City Bolt & Nut Co., Kansas City, Mo.	1	22"	Billet
Massillon Reinforcing Bar Co., Massillon, O.	1	15"	Bar
Massillon Rolling Mill Co., Massillon, O.	2	28"	Sheet
Midvale Steel & Ordnance Co., Coatesville, Pa.	1	..	Skelp
Milwaukee Rolling Mill Co., Milwaukee	8	28"	Sheet
Milwaukee Rolling Mill Co., Milwaukee	4	24"	Cold rolls
Nat'l Enamel. & Stamping Co., Granite City, Ill.	6	24"	Cold rolls
Nat'l Enamel. & Stamping Co., Granite City, Ill.	10	28"	Black plate
Nat'l Enamel. & Stamping Co., Granite City, Ill.	1	24"	Sheet bar
National Tube Co., Lorain, O.....	2	..	Tube, lapweld
Reading Iron Co., Danville, Pa.....	1	18"	Skelp
Republic Iron & Steel Co., Niles, O.	8	30"	Sheet
Republic Iron & Steel Co., Niles, O.	6	26"	Cold rolls
Steel & Tube Co. of America, Indiana Harbor, Ind.	1	..	Tube, seamless
Steel & Tube Co. of America, Indiana Harbor, Ind.	1	24"	Billet
Superior Steel Corp., Carnegie, Pa..	8	..	Cold strip
Trumbull Steel Co., Warren, O....	1	9"	Hot strip
Trumbull Steel Co., Warren, O....	12	..	Cold strip
United Alloy Steel Corp., Canton, O.	1	12"	Merchant
Warren Iron & Steel Co., Warren, O.	4	30"	Sheet
Warren Iron & Steel Co., Warren, O.	2	24"	Cold rolls
Weirton Steel Co., Weirton, W. Va.	1	40"	Blooming
Weirton Steel Co., Weirton, W. Va.	1	21"	Slab and billet
Weirton Steel Co., Weirton, W. Va.	1	18"	Billet and sheet bar
West Leechburg Steel Co., West Leechburg, Pa.	1	..	Cold strip
Whitaker-Glessner Co., Portsmouth, Ohio	1	18"	Billet and sheet bar
Whitaker-Glessner Co., Portsmouth, Ohio	7	30"	Sheet
Whitaker-Glessner Co., Portsmouth, Ohio	12	30"	Cold rolls
Worth Steel Co., Claymont, Del....	1	42"	Plate
Total	185		

Table X

Rolling Mills Building Dec. 31, 1921

Company	Number stands		Type mill
Ashtabula Steel Co., Ashtabula, O..	8	23"	Sheet.
Ashtabula Steel Co., Ashtabula, O..	4	26"	Cold rolls
Hudson City Steel Corp., Hudson, N. Y.	10	..	Cold strip
Illinois Steel Co., Gary, Ind....	1	12"	Hot strip
Illinois Steel Co., Gary, Ind....	1	20"	Hot strip
*Inland Steel Co., Indiana Harbor, Ind.	1	..	Rail
International Steel Tube Co., Cleveland	2	..	Tube, buttweld
Mansfield Sheet & Tin Plate Co., Mansfield, O.	1	32"	Blooming
Mansfield Sheet & Tin Plate Co., Mansfield, O.	1	24"	Sheet bar
Mansfield Sheet & Tin Plate Co., Mansfield, O.	6	30"	Sheet
Mansfield Sheet & Tin Plate Co., Mansfield, O.	1	28"	Black plate
Minnesota Steel Co., Duluth, Minn..	1	..	Rod
Otis Steel Co., Cleveland.....	8	30"	Sheet
Pacific Coast Steel Co., Youngstown, Wash.	1	20"	Universal
Pacific Coast Steel Co., Youngstown, Wash.	1	10"	Merchant
Pacific Coast Steel Co., Youngstown, Wash.	1	8"	Merchant
Trumbull Steel Co., Warren, O.....	1	14"	Hot strip
Worcester Pressed Steel Co., Worcester, Mass.	1	12"	Hot strip
Total	50		

*Replaces 28" structural mill completed in 1916.

group of the National Tube Co.; No. 2 furnace of the National Tube Co., McKeesport, Pa.; the Standish furnace of the Northern Iron Co., Standish, N. Y.; No. 1 furnace of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala.; the Martins Ferry stack of the Wheeling Steel Corp., Martins Ferry, O., and the No. 2 stack of the Wheeling Steel Corp., Steubenville, O., a total of eight furnaces.

Effect Economy in Production

To effect economy in the production of pig iron by clinkering flue dust on hand and also dust produced at its Johnstown, Pa. group of blast furnaces, the Cambria Steel Co. installed two large-size Dwight & Lloyd sintering machines last year. The plant was fully decribed in the Nov. 3, 1921 issue of THE IRON TRADE REVIEW.. The sintering plant at the Aliquippa works of the Jones & Laughlin Steel Co. was enlarged and provisions made for handling the flue dust and exhaust gases by a different arrangement than was employed in the original design. At the close of the year the Carnegie Steel Co. had underway a sintering plant of the Greenwalt type at its Edgar Thomson works, North Braddock, Pa.

To facilitate unloading of ore economically during the winter months, the Carnegie Steel Co. last year completed a thaw house at the National works, McKeesport, Pa. Blast furnace gas cleaners of the Kling-Weidlein type completed last year include one each at the No. 1 furnace of the Carnegie Steel Co., New Castle, Pa., and at the No. 3 furnace of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala. At the beginning of 1922 the Carnegie Steel Co. had a dry gas cleaner of this type under construction at its No. 3 furnace, Mingo works, Mingo Junction, O.

Among the blast furnace improvements under way at the plants of the Cambria Steel Co. are the construction of three hot stoves for No. 5 furnace, dry gas cleaners for Nos. 5 and 6, ore and limestone bins for furnace Nos. 7, 8 and 9 and a new ore bridge for the Franklin blast furnace group. Stacks Nos. 6, 7 and 8 and three stoves for Nos. 6 and 7 are being relined. Coke handling and conveying systems for Nos. 7, 8 and 9 and Nos. 10 and 11 were completed during the past year and the stoves of No. 9 were relined. No. 1 furnace of the Coatesville plant of the Midvale Steel & Ordnance Co. is being relined.

Electric Furnace Construction Low

Strengthening an assertion made six months ago that the year 1921 would be stamped by the electric steel industry as the low water mark in the growth of electric furnaces, is the fact that only 13 electric furnaces designed for steel castings or ingot production were built, as shown in Table XI. Not since 1910 when the elec-

tric steel industry began is phenomenal march of progress has the number of new electric furnaces completed in any one year fallen to such a low point. During 1920 the number of units built totaled 34. Records for 1919 indicate that 53 electric furnaces of various types were completed while 1918 showed the number at 54. During 1917 the number of electric furnaces completed was 97, while 1916 claimed 63, and 1915 only 32. From Jan. 1, 1915 to Jan. 1, 1922 about 345 electric furnaces have been adapted to the iron and steel industry in this country for melting or refining purposes. On Jan. 1, 1922 six electric furnaces were under construction. Last year a new company, the Repel-Arc Furnace Co. with headquarters at Indianapolis, entered the field of electric furnace builders. It will manufacture and sell the repelling arc furnaces formerly made by the Industrial Electric Furnace Co. of Chicago.

Sheet Mills Again Lead

Rolling mill expansion during 1921 embraced 185 various type mills, as shown in Table IX. As in 1919 and 1920, sheet mills again topped the list, Tables I and IX showing 59 units. Various type rolling mills built during 1919 totaled 50; the following year 241 were placed under power. Forty-four per cent of the mills completed during 1919 and 34 per cent of those laid down in 1920 were adapted to the hot rolling of steel sheets. Last year 32 per cent of the rolling mills built were hot sheet mills. An interesting sidelight in connection with the total number of sheet mills built last year is that their location is confined to three states, 39 being in Ohio, 12 in Indiana, and eight in Wisconsin. Attention also is attracted to the fact that the 22 sheet mills, which were under construction at the close of 1921, are located in Ohio. As a result of the 59 hot sheet mills laid down last year the country's annual sheet output is estimated to have been increased 361,670 tons. During 1919 134,860 tons were added to the national sheet production by the completion of 22 mills while the 62 units completed in 1920 afforded 380,000 tons of sheets. Therefore, in the last three years it is estimated conservatively that the 143 hot sheet mills laid down has netted the industry about 876,590 tons.

The completion of the eight new sheet mills at the Niles, O. plant of the Republic Iron & Steel Co. last year increased the number of hot sheet mills in the Mahoning valley from 105 to 113 and the annual capacity from 643,000 to 703,400 tons. The standing of the Republic company thus was raised from the fifth to the second largest sheet producing interest in that territory, it now having 18 hot sheet mills available for operation. The Brier-Hill Steel Co. still retains the lead with 28 mills. The Trumbull Steel Co. is third with 17 mills, the Youngstown Sheet & Tube Co. fourth with 15 units, the Newton Steel Co. fifth with 10 mills, the Sharon Steel Hoop Co. is sixth with nine mills, while the Falcon Steel Co. and the Mahoning Valley Steel Co. are tied for seventh place, each having an eight-mill plant.

Table XI

New Electric Furnaces Operated in 1921

	No. of furnaces	Size tons
HEROULT		
American Manganese Steel Co., Chicago Heights, Ill..	2	3
American Manganese Steel Co., Chicago Heights, Ill.	1	6
Atlas Crucible Steel Co., Dunkirk, N. Y.	1	6
*Electric Engrg. & Foundry Co., Tacony, Pa....	1	1
Milton Mfg. Co., Milton, Pa.	1	6
Naval Ordnance Factory, S. Charleston, W. Va.	2	40
Naval Ordnance Factory, S. Charleston, W. Va.	1	1
Vulcan Crucible Steel Co., Aliquippa, Pa.	1	3
GREAVES-ETCHELLS		
*Ford Motor Co., Dearborn, Mich.	2	15
*Ford Motor Co., Dearborn, Mich.	1	60
GREENE		
Los Angeles Foundry Co., Los Angeles	1	3½
Greene-Shaw Co., Berkeley, Cal.	1	500 lbs.
UNCLASSIFIED		
*Bethlehem Steel Co. Steelton works, Steelton, Pa.	1	6
*The Lorain Steel Co., Johnstown, Pa.	1	4
Williamson-Harrison Machine Co., Cordele, Pa.	1	1
Total completed Dec. 31, 1921	12	
*Total building Dec. 31, 1921	6	

Strip Capacity Gains

Cold-rolled strip capacity was increased last year by the completion of 41 stands of rolls. The activity in this direction undoubtedly is due to the increased demand of the automotive industry and to the growing tendency to substitute cold-rolled strip steel for sheet steel because the former in the dead soft state is better adapted for deep drawing work by reason of the fact that it never is cross-rolled during the process of manufacture nor cut finished. As the year 1921 closed, 50 rolling mills of various types were under construction including 22 hot sheet mills and 10 cold strip mills, or 45 and 20 per cent, respectively, of the total plant capacity.

Of particular interest is the entry of the Inland Steel Co., Indiana Harbor, Ind., into the production of standard steel rails which field has been occupied for many years by eight steelmakers. The Inland company now is engaged in altering its 28-inch structural mill to rolling rails from 60 pounds to the heaviest section now in use and in lengths up to 44 feet. Expectations are that the mill will be ready for scheduling about March 1, 1922. At present the Colorado Fuel & Iron Co. and the Illinois Steel Co. are the only plants in the West equipped to roll standard rail sections.

Rearranging Sheet Mills

The sheet mills at the Whitaker works, Wheeling, W. Va., of the Whitaker-Glessner Co. are being rearranged into two trains of six hot mills each. New and modern sheet and pair furnaces designed to burn powdered coal will be built; sheet bars will be delivered to these furnaces by a traveling crane. A new boiler and power house which will include four 823-horsepower boilers and two 600-kilowatt generators now are under construction. When these are completed the old boiler installation serving the hot mill and finishing departments will be dismantled. During 1921 this company also replaced several old buildings that were occupied by the black plate and tinning departments with a new structure covering about 100,000 square feet of floor space.

The Steel & Tube Co. of America last year completed its bessemer plant which includes two 15-ton vessels, three 20-ton cupolas and a 600-ton hot metal mixer, and affords 780,000 tons of bessemer steel annually. This is the first bessemer plant built in this country in several years.

Toward the close of last year the International Nickel Co. had commenced the construction of a new plant at Huntington, W. Va., for rolling monel metal. The size mills which will be installed include a one 4-stand 9-inch merchant; a 5-stand 9-inch merchant; a 5-stand 10-inch merchant; a 3-stand 14-inch merchant; a 5-stand 14-inch merchant; a 5-stand, 20-inch merchant; and a 2-stand 24-inch bar mill, or a total of seven mills. Various mill equipment includes tilting tables and tilting mechanism for the 24-inch unit; a 6 x 30-inch bloom shear; a lever shear; three squaring shears; three vertical bar shears; an annealing furnace charging machine; a sliding frame saws; and cropping shears. The new plant is expected to get under way during 1922.

Tariff Is Not Favored in Britain

Rerolling Industry with Annual Capacity of a Million Tons Influential in Shaping Free Trade Policy—How the Key Industries Act Affects British Steel Trade—Why Billets Are Imported

BY JOSEPH HORTON
British Correspondent of The Iron Trade Review

A PROMINENT official of the leading British steel trade association said recently, "Our iron and steel industry is still strongly and predominantly in favor of free trade. England's island position, with her 'close' commercial ties with the continent naturally favors this policy." So there has grown up in the United Kingdom, and especially in England, an important branch of iron and steel manufacture devoted exclusively to rerolling semi-finished steel, large quantities of which are imported every year. The capacity of these mills based on prewar imports of billets, etc., is around a million tons a year.

These plants, from the British standpoint, perform an important economic function. They serve to keep general iron and steel prices in line with world levels, thus facilitating exports, and in times of business stress such as have recently been experienced, the rerollers are always able, it seems, to get business, thus giving employment and helping to maintain England's overseas trade connections. This results from their being in a position to buy their raw material, under free trade conditions, in the cheapest or most available market, whatever that may be. Most of the rerolled finished material is again re-exported in one form or another. This is one of the reasons why England's iron and steel balance of trade, regardless of fluctuations in tonnage ratios, in point of value is always heavily in her favor.

In other words, owing to Britain's peculiar geographical position, her rerolling business acts as a balance wheel to her general iron and steel industry. It is also a major influence in shaping her tariff policies. The role played by the British rerolling industry, is, therefore, an important one in the iron and steel economy of the United Kingdom. In order that its position may be more thoroughly understood by American readers, the accompanying article has been prepared by the experienced British correspondent of THE IRON TRADE REVIEW.

STUDENTS of international economics could derive illumination from a careful study of the part played by the rerolling branch of the British steel industry during the general business depression of 1921. Several irresistible conclusions would emerge from such a study. The undoubted fact is that while nearly all the British steelworks were idle, the rerollers have been more or less busy throughout the year and by the utilization of cheap foreign steel were generally able to make a quite satisfactory profit. Incidentally, the student is not unlikely to come to the conclusion that in spite of the talk about protection, which has come a good deal to the surface in recent months, and has so far materialized as to bring into existence the safeguarding of industries act, under which, under certain conditions, a 33 1/3 per cent tariff is imposed upon incoming manufactured products, even the British steel trade is very far from being a whole-hearted advocate of tariffs.

The socalled key industries act, although backed by the house of commons, provoked fierce controversy during its passage; and the columns of Hansard (the short term by which Englishmen describe the official records of debates) include numerous speeches from steelmakers, steel users and their representatives fighting their hardest to defeat the bill. One of the most remarkable statements was by Brigadier-General Hickman, a director of Alfred Hickman, Ltd., a large Staffordshire steelmaking concern, who declared that he did not believe anyone in the iron and steel industry would ask for a tariff. That is not quite correct, because individual manufacturers do occasionally suggest in trade meetings that authority should be applied for with a view to inducing the board of trade, by means of powers and conditions conferred under the act, to take the necessary steps for the imposition of a tariff. But from a good deal of inside knowledge, the writer would say it is quite impossible to secure sufficiently representative support to such an appeal to influence the board of trade. On the other hand, one of the most cogent memorials entered against the passing of the bill, emanated from a steel rerolling firm, which strongly protested that an effective tariff would ruin its business and ultimately would work nothing but injury to the steel trade as a whole.

British Rerollers

Whitehead Iron & Steel Co., Ltd., Tredegar.
District Iron & Steel Co., Ltd., Smethwick, Birmingham.
Wigan Coal & Iron Co., Ltd., Wigan, Lancs.
Monks, Hall & Co., Ltd., Warrington, Lancs.
Hull Forge Iron & Steel Co., Ltd., Hull.
Patent Shaft & Axletree Co., Ltd., Wednesbury, Staffs.
J. & C. Holcroft, Ltd., Tipton, Staffs.
N. Hingley & Sons, Ltd., Brierley Hill, Staffs.
Roberts & Cooper, Ltd., Brierley Hill, Staffs.
George Gadd & Co., Ltd., Tipton, Staffs.
Johnsons Iron & Steel Co., Ltd., West Bromwich, Staffs.
Bromford Iron Co., Ltd., West Bromwich.
S. Newton & Sons, Nine Locks Ironworks, Brierley Hill.

Big Concerns In the Business

The rerolling of bars, skelp, angles, sections in great variety is a steadily growing industry in Great Britain and a large number of important firms are engaged in this line of work. The accompanying list is not exhaustive, but probably includes the most representative concerns engaged in the trade. It will be seen that the works are largely located in South Staffordshire, but the largest of them, the Whitehead company, of Tredegar is a Monmouthshire firm which, although an English county, for all practical purposes belongs to South Wales. This firm shares with the District Iron & Steel Co. of Smethwick near Birmingham, the distinction of possessing the only continuous mills in the rerolling industry, and both concerns deserve a little attention in regard to the details of their plant.

South Staffordshire firms as a whole have largely turned to rerolling as the result of the growing demand for steel, aided by the readiness with which their plant could be adapted for steel rolling, many of them formerly rolling puddled iron. The utilization of steel

billets has been of the greatest advantage to them in a number of cases, owing to the old fashioned and expensive character of the layout from the point of view of out-and-out iron production. Some of the plants in fact now roll nothing but steel billets, slabs, etc., and on the whole the business has been profitable.

It will be seen from the appended official statistics that the tonnages of foreign billets imported into Great Britain made quite a respectable total even in June, which was the third month of the coal strike. Although it is not possible to give the latest figures, the total now is declining. Later these imports may rise again. They fluctuate with current trade conditions in the respective countries of supply, and according to the price and availability of British semifinished steel. It must be remembered that England's rolling capacity exceeds her steelmaking capacity, and that she is usually importing, either because for the time being foreign semifinished is cheaper or because her own supplies are short.

But just because England is importing large tonnages it does not follow that her iron and steel industry is on the road to ruin. Rather the reverse is true. England is small and her geographical position is somewhat analogous to that of the state of Ohio which "imports" coke, pig iron and other steelmaking materials from the neighboring states of Pennsylvania and Indiana. France and Belgium lie next to Britain like these states border on Ohio. Exporting and importing in Europe is physically different than in the United States. The American is accustomed to think of export trade as connected with great distances. In studying exports and imports in Europe, and their related tariff problems, one's conceptions should be revised to fit European geographical conditions.

Fig. 1—Double sided cooling bed and bar shears at plant of Whitehead Iron & Steel Co., Tredegar. Fig. 2—Shears for cutting bars to length at Tredegar

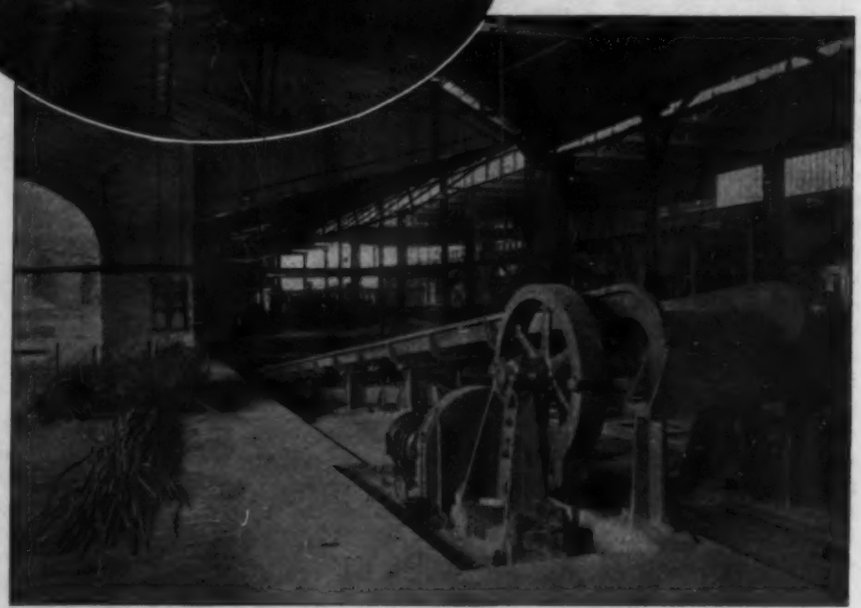


Fig. 3—(Below) delivery end of electric driven elevator for delivering wire rods from reels to cars at Whitehead plant

British iron and steel imports rose heavily in 1921, and some people took alarm from this fact, while a few outside observers in America and elsewhere concluded that this indicated a decadent condition. Such is not the case. Actually last year's imports were less than in 1913, and the fact that they took place during a time when British-made steel was above the world's market, enabled Great Britain to retain valuable overseas trade in finished materials which otherwise would have been lost. On the other hand in times of strong demand like most of 1920, these imports, owing to the unbalanced condition previously referred to, enable England to increase materially her volume of business in finished steel. It was for this purpose that heavy importations of billets, etc., took place from the United States at high prices in 1920. England made money on all this tonnage. British semifinished steel imports show a tendency to rise and the rerolling business to be active both in times of extreme depression and great prosperity, with perhaps lesser relative activity in intermediate periods.

These facts were pressed home time after time during the debate on the safeguarding of industries bill, a measure in which the rerollers were deeply interested. This bill passed in October, but in only a limited degree is it a tariff act. The free trade influence in parliament was so strong the bill was shorn of most of its important provisions. It consists of two parts. Part I levies duties of 33 1/3 per cent on a limited range of products having an especial value in time of war, chief among which are optical glass and certain chemicals. Part II is designed to prevent dumping, either directly or

as a result of depreciated exchanges, and under its provisions a 33 1/3 per cent duty might be charged on anything imported, but the procedure leading up to the levying of the duty, as will be described later, is of such a nature that this part of the act seems to be virtually a dead letter.

Dealing with the possible effort of this act on the steel rerolling trade, in the debates in parliament Mr. Asquith pointed out that while Belgian sheet bars were being bought at £6 10s a ton the makers of steel sheets on the Northeast coast were exporting 75 per cent of their production, and were only

British steel syndicates, made the remarkable reply that this tariff bill is a temporary measure to meet unemployment, which it is hoped is a temporary contingency. Mr. Baldwin's attitude all along, was almost apologetic for the bill. In one phrase, which has become historic, he compared it to a foundling baby left on the doorstep of the board of trade, which he felt obliged to take under his protection.

Americans who really want to understand the relation of Britishers to questions of tariffs, and, in particular, the attitude of the steel trade, cannot do better than fix their attention upon

as a practical measure. To begin with it is not easy to get a tariff imposed under this act. Any representations in this direction must come from a large and qualified body of manufacturers, preferably in association, after which, if sufficiently influential, a board of trade committee will take evidence as to the necessity for a tariff. That evidence would necessarily be of a contradictory character, and it should be noted that the only evidence which would influence the committee would be representations that a tariff is necessary in the interest of increasing employment. The

British Imports of Semifinished Steel, 1921

BLOOMS, BILLETS AND SLABS

Gross Tons and Value in Sterling

Month 1921	Total		From Belgium		From France		From U. S. A.		From Sweden		From Germany		From Netherlands		From Canada		From Luxembourg	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Jan.	26,257	£434,645	20,218	£303,966	202	£ 3,145	1,201	£22,625	355	£13,936	....	....	...	....	4,203	£89,786	78	£1,187
Feb.	20,385	319,410	16,574	239,242	1,227	19,450	2,207	44,582	377	16,136	...	....	...	....	....	....	....	....
March	15,637	214,489	11,739	146,025	2,358	30,489	....	....	258	11,620	84	£897	...	....	1,002	23,058	196	2,400
April	7,685	95,011	5,409	51,256	1,385	13,605	176	7,261	155	6,453	99	1,887	21	£148	....	....	440	4,401
May	6,163	77,551	2,943	30,786	1,906	18,242	560	11,381	286	11,455	...	....	...	....	....	....	....	466	5,666
June	11,517	98,992	3,299	28,549	6,173	50,648	....	....	70	2,066	...	....	...	....	....	....	....	1,975	17,729
July	10,480	104,594	4,616	44,591	4,030	32,161	1	10	413	15,271	771	7,543	...	....	....	....	....	649	5,018
Aug.	15,296	135,801	6,014	56,034	6,814	52,571	....	....	247	9,736	671	5,408	469	4,530	....	....	....	1,081	7,522
Sept.	19,902	166,655	9,058	74,754	4,600	39,256	....	....	283	3,377	696	2,971	2,115	16,900	....	....	....	3,151	23,197

just able to do so at a profit by using foreign semifinished. If the 33 1/3 duty were imposed on imported Belgian sheet bars and billets, the effect would be that a large body of English manufacturers supplying finished goods would be killed as exporters in the neutral markets. Another member of parliament, T. Thomson, urged that the bill "was imperilling a large industry that had grown up during the last 20 or 30 years, the industry of rerolling semifinished steel products that come in from abroad. There was a very real fear among these industries, which employ hundreds of thousands of men, and imported in the year 1913 over 1,000,000 tons of raw or semifinished steel and iron products, that if these anti-dumping clauses were carried out in the spirit in which one section of the coalition government would like to see them carried out, those industries would be seriously jeopardized."

Mr. Thomson added an important statement to the effect that in the rolling of thin sheets and light shapes, an industry which has been built up in England during the last 20 years, the country has a specially skilled form of trade, which has taken many years to create, and in which sons follow fathers.

To these representations, Mr. Baldwin, the president of the board of trade, who, by the way, until he entered the government was the head of Baldwins Ltd., one of the biggest of

these very significant happenings in parliament, which are merely a repetition of similar occurrences whenever an attempt has been made to apply tariffs on a serious scale.

It is not a little curious that steel manufacturers who produce from the raw material, and are directly affected by the importation of semifinished steel, never raise a voice in favor of its exclusion. Many of them secretly rejoice at the impetus thereby given to the process by which prices are being forced to a rock-bottom, and therefore to a more stable business basis. This is explicable on the ground that the slide in prices carries with it under the sliding scales a downward movement in wages, coal and every material entering into production, and from this point of view, it is not at all unlikely that business recovery in Great Britain will be at least as rapid as in any other.

For Free Imported Steel

The fact should not be overlooked that the galvanized sheet industry and the kindred trade of tin plate manufacture, both essentially rerollers are whole heartedly for free imported steel, and it is not without significance that these trades are giving a good lead in the way of recovery.

One effect of the fierce hostility directed against the safeguarding of industries bill was to cripple it largely

board of trade recently gave to a correspondent, a list of 25 countries in regard to which before setting up a tariff it would first be necessary to abrogate some commercial treaty after periods of notice ranging from 3 to 12 months. In the case of 16 nations, including a number of European countries, the period is 12 months, so thoroughly has the free-trade principle become woven into English policy.

It is not surprising under these circumstances most people engaged in the iron and steel trade, even including protectionists, have made up their minds that the possibility of getting any assistance from the key-industries act is somewhat remote. In any event, the difficulty of getting any united representation likely to influence the board of trade in favor of tariffs would be very great.

It is well known that shipbuilders are keen on buying their steel in the cheapest market, and a powerful effort was made to exempt goods used in shipbuilding and repairing from the operation of the key industries act. The effort was defeated by 198 votes to 81, but under the present conditions prevailing in the shipbuilding industry, he would be a very bold politician who would seek to enforce, under the act, prohibition of foreign material.

Two of the most important works in Great Britain engaged in rerolling are

as previously mentioned, those of the Whitehead Iron & Steel Co., Ltd., at Tredegar and Newport, and the District Iron & Steel Co., Smethwick, Birmingham. The former is now wholly devoted to the rerolling of semifinished steel, puddling having been abandoned in 1905. The output from the Tredegar works is 70,000 tons and from the Newport plant 120,000 tons per annum. At Tredegar is a semi-continuous Morgan bar rod and hoop mill, a 14-inch 3-high guide mill, and a 10-inch 3-high guide mill. The plant at Newport includes a Morgan continuous strip and hoop mill, It is of the latest design of the Morgan Construction Co., Worcester, Mass., and is an improvement on the strip mill of this type installed at the Acme Steel Goods Co.'s works at Chicago in 1919. Room is provided at these works for the installation of three other mills, served from a central billet storage. The mills are driven by one 2500 horsepower, one 1500-horsepower and one 100-horsepower motors on the direct-current system. All auxiliaries are electrically driven, and steam is only used for the flying shears, and furnace pushers. It is considered that the number of men employed is low, having regard to the tonnage handled.

FIG. 5—HANDLING STRIP FROM 3-HIGH ROLL TRAIN IN MILL OF DISTRICT IRON & STEEL CO., SMETHWICK, BIRMINGHAM

The geographical position of both works is favorable, the Tredegar works being close to the South Wales steel and coal area and about 22 miles from the Newport docks. The Newport works has direct access to the docks, and it is claimed that Newport is the finest equipped port of its size in the world, capable of handling ships of the largest tonnage. For dealing with exported material, and imported billets, the Whitehead company believes that its two plants are probably the most favorably situated in the country. The railway facilities are excellent, and the billets are delivered by the railway company to the rear of the furnaces by means of the gravity system, the storage ground having a capacity of 1500 tons. All the latest devices such as billet pushers, and cutters are included in the plant. The District Iron & Steel Co., of Smethwick, Birmingham, resembles the Whitehead concern in having abandoned primary iron and steel manufacture, concentrating entirely upon rerolling. It consists of five mills, with a weekly capacity of 2500 tons. It has a continuous mill, with a sloping furnace, the plant being driven electrically by means of power purchased from a large power corporation in the neighborhood, while the heating is done by means of gas obtained from a gas-producer plant.

The Staffordshire wrought iron trade is now in a parlous condition, and this circumstance in itself has assisted the development of rerolling. As mild steel becomes more and more applicable to purposes for which wrought iron formerly was used, there is not much doubt that the trade revival which has now fairly commenced will coincide with a large development in this important branch of the iron and steel trade.

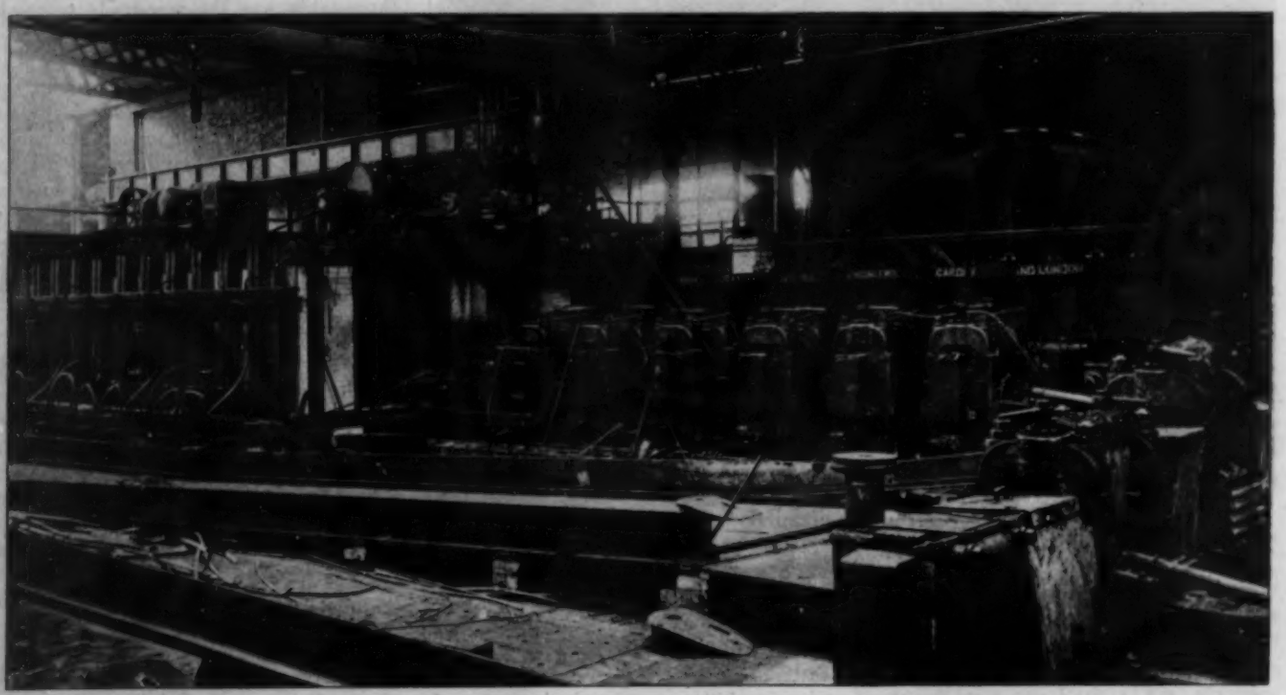


FIG. 4—HEATING FURNACE, CONTINUOUS ROUGHING MILL AND FIRST STAND OF FINISHING ROLLS AT WHITEHEAD

Ten Groups Take Bulk of Steel

Comprehensive Analysis Is Made of the Division of the Country's Steel Output According to Consumptive Requirements—Building Leads All Fields—Railroad Demands Shown To Have Been Overestimated—How Wire Is Distributed

BY E. C. KREUTZBERG

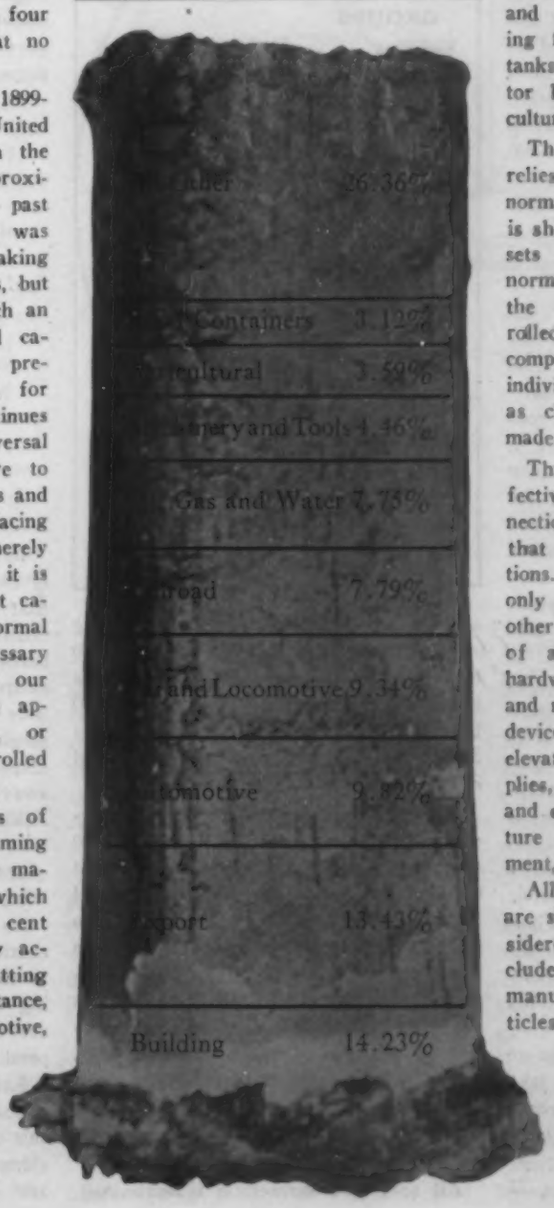
IN ATTEMPTING to show the relationship between the principal rolled iron and steel consuming industries of the country and steel output, it is necessary to start with an assumption as to what constitutes a normal supply of steel. Here there is room for argument, depending on whether it is thought that some of the capacity which was developed during the war should be marked off as being in excess of normal consuming requirements. But the continued remarkable expansion of steelmaking capacity over the past four decades would tend to indicate that no such allowance need be made.

In the decades 1889-1899 and 1899-1909, the output of steel in the United States was practically doubled. In the last decade the increase has been approximately 33 1/3 per cent. In the past there have been periods when it was thought that the capacity for making steel was in excess of requirements, but demands each time increased to such an extent that before long additional capacity was required. Undoubtedly previous experience will be repeated, for the population of the country continues to grow, and steel is the "universal metal." The use of steel is sure to increase; the depletion of our forests and the extent to which steel is replacing wood for countless purposes is merely one suggestion of this. Therefore, it is fair to regard the country's present capacity as the proper index of its normal requirements. Making some necessary allowances, it may be said that our normal requirements per year are approximately 32,000,000 gross tons, or 35,840,000 net tons, of finished rolled iron and steel products.

While there are countless uses of steel, hundreds of industries consuming it in some form or other as a raw material, there are ten great groups which require slightly more than 76 per cent of this total. The latter normally account for 27,340,000 net tons. Putting them in the order of their importance, they are the building, export, automotive, oil, gas and water, car and locomotive, general railroad and railway, machinery and hand tool, agricultural, food container, and shipbuilding groups. When one or more of them reflect a depression, the effect on the steel industry is immediate and direct.

In this classification the automotive industry is considered to include the manufacturing of all those plants engaged in the building of automobiles, trucks, trailers and trailmobiles; in the manufacture of axles, shafts and forgings for all kinds of vehicles, in the manufacture of all kinds of ball and roller bearings; in the manufacture of vehicle springs of all kinds but not including railroad springs; in the manufacture of all other automobile accessories and supplies; and in addition the equipment and other needs for the maintenance and operation of these vehicles including filling and service stations, storage tanks, etc. The requirements for tractor building are included in the agricultural group.

HOW the steel output of the country is divided among principal consuming industries, is shown graphically by the apportionment of the ingot below. The percentages represent the estimated normal requirements of each group.



The extent to which the steel industry relies on each of these groups as a normal outlet for finished rolled steel, is shown in the table on page 48, which sets forth the approximate tonnage normally required by each, together with the percentage of the total finished rolled iron and steel output normally comprised in the requirements of each individual group. The figures represent as close an approximation as can be made from existing compilations.

That these figures may be analyzed effectively, some detail is essential in connection with the various uses of steel that go to make up the ten classifications. The building field comprises not only structural concrete reinforcing and other steel of all kinds for structures of all kinds, but steel for builders' hardware and supplies, for fire escapes and railings, for blowers and ventilating devices, casement and window sash; elevators, safes and vaults, plumbers supplies, heating systems and appliances, and equipment employed in the manufacture of building materials such as cement, brick and tile.

All finished rolled steel products which are shipped out of this country are considered in the export field. This includes the normal requirements for the manufacture of various completed articles for export in which finished rolled steel products are used. The oil, gas and water group includes all steel required in the production and transportation, outside of buildings, of oil, gas and water. The car and loco-

motive field embodies the steel requirements for locomotives and steel cars of all kinds. The railway group comprises the miscellaneous requirements, exclusive of cars and locomotives, of all railroads and railways for construction, maintenance and repairs.

In the machinery and hand tool classification are included the tonnages of finished rolled steel which go into machinery, machine parts and tools, and hand tools. The agricultural field embraces agricultural implements and machinery, tractors, wire fence and barbed wire, forks, rakes, hoes, shovels and other farmers' tools; wagons, carriages, buggies and sleighs, wheels and other equipment and supplies in connection with farm implements, and vehicles. The food container group includes principally the steel which takes the form of so-called tin cans and other food containers.

Incidentally, the term "finished rolled iron and steel products," as used in this analysis of distribution, is employed in its usual sense. It is inclusive of rails, plates, sheets, nail and spike plate, shapes, bars, skelp, hoops, bands, cotton ties, splice bars, tie-plate bars, piling, railroad ties, forging blooms and billets, tin plate, wire products and other rolled materials.

Wire Rods Take 10 Per Cent

Approximately 10 per cent of the steel output of this country takes the form of wire rods. It is estimated that a normal business calls for approximately 3,000,000 gross tons of wire rods a year. Of this total, 15 per cent is exported either as rods or wire. About 65,000 gross tons of rods are sold for manufacture into bolts, screws and rivets, 40,000 tons are manufactured into chain, a moderate tonnage is used in concrete work, particularly as spirals in columns, considerable tonnage is used in reinforced stamped ware, such as wheelbarrows and implement parts. All this miscellaneous wire rod business comprises a total of about 275,000 tons. This leaves about 2,275,000 gross tons which are drawn into wire for domestic use. In drawing the wire there is a scrap loss of 5 to 10 per cent. It long has been customary to regard a gross ton of rods as approximately equivalent to a net ton of wire. Thus, the wire output which is sold in the United States normally is around 2,-114,375 gross, or about 2,368,100 net tons per year.

Of this total, some 400,000 net tons go into fencing, of which farmers take about 93 per cent and the railroads about 7 per cent. About 550,000 net tons, or 11,000,000 kegs, go into nails; of this total the building industry takes 77 to 78 per cent, the package industry takes 7 or 8 per cent and the remainder goes to the farmers. About 300,000 tons go into barbed wire and staples, of which 93 per cent goes to the farmers and the remaining 7 per cent to the railroads. Socalled manufacturers' wire accounts for the remainder, or approximately 1,118,100 net tons. Of the latter total about 125,000 tons go into wire rope; some 50,000 tons of round wire, as a result of the development of special bundling machinery, go into the package industry; 65,000 tons go into bolts, screws and rivets; 30,000 tons go into spring wire and furniture springs; about 75,000 tons go into bale ties; about 30,000 tons go into concrete reinforcing; about 5000 tons go into steel electrical wire; about 30,000 tons go into poultry netting and 25,000 tons go into chain.

Finished Steel Output Divided by Demands

Estimates in Net Tons

GROUPS	Normal annual requirements	Per Cent entire normal
Building	5,100,000	14.23
Export	4,815,000	13.43
Automotive ...	3,540,000	9.82
Car and locomotive	3,350,000	9.34
Railroad, construction maintenance and repairs..	2,795,000	7.79
Oil, gas and water	2,780,000	7.75
Machinery and hand tool....	1,600,000	4.46
Agricultural ...	1,290,000	3.59
Food container	1,120,000	3.12
Shipbuilding ..	950,000	2.65
All other requirements .	8,500,000	23.71
Totals	35,840,000	99.89

There are innumerable smaller divisions of manufacturers' wire; for instance, 1500 tons is converted annually into pins and 600 tons go into wire for bonnets and hats and several hundred tons go into florists' wire. The manufacturers' wire class, embraces a host of different products which are grouped together as the wire goods industry. These products include waste baskets, filing baskets, wire clips, fly swatters, egg beaters, oven racks, hooks and eyes, garden tools, coat hangers, carpet beaters and hundreds of similar articles.

All told, the farmer, it is estimated, in a normal year takes 372,000 net tons of wire fence, 279,000 net tons of barbed wire and staples, and 82,500 net tons of nails. The building industry takes 426,250 tons of nails annually. The railroads use 49,000 tons of wire fence and barbed wire and staples each year.

In addition to taking practically all the fence and the barbed wire and staples, and 15 per cent of the nails, farmers buy good sized quantities of chain, etc. Counting the wire in the implements and tools that they buy, and the nails in crates and boxes; the wire around bundles that they receive, the wire reinforcing at the tops of buckets, milk-pails, cans, etc., the farmers ultimately receive probably 60 to 75 per cent of the entire wire consumption of the country.

Wire and wire products, of all finished steel products, find their greatest distribution through second hands. In the majority of the heavier products, such as plates, shapes and bars, the tonnage going through the jobbers' hands has shown a constant tendency to decrease. It is estimated, however, that at least 65 per cent of the entire domestic requirements of wire and wire products are distributed by jobbers and merchants. Even the socalled manufacturers' wire, after it is worked into its final product, is marketed by merchants, so that the jobber or merchant eventually handles virtually all the wire that is consumed in this country. At least 90 per cent of the fence and barbed wire, and at least 15 to 20 per cent of the plain wire are marketed by the merchants.

West Uses Barbed Wire

Barbed wire still is the most extensively used material for fencing in the West, that is west of the Missouri and the central part of Nebraska. In the East, barbed wire has been succeeded almost entirely by fence, although barbed wire continues to be employed as a single strand on top of the wire fence. Export demand also is veering slightly away from barbed wire towards fence. Aside from fence and barbed wire, the wire exported from this country frequently takes the form of galvanized wire, baling wire and wire nails.

An important recent development greatly enlarging the field of usefulness of wire is the use of wire mesh for reinforcing concrete roads. Present indications are that the field will continue to expand.

Large head roofing nails also are increasing rapidly in distribution as a result of the decrease in the use of wood shingles. The large head roofing nails are used in connection with prepared

roofing material. Numerous other outlets for wire constantly are being developed. An industry which is taking a fair tonnage of wire every year is that involving the manufacture of link fencing for use around factories.

The wire manufacturers have standards to meet almost every requirement. At least 90 per cent of the wire which is used in this country is specified to standards.

Normal annual requirements of structural shapes by the various consuming industries of the United States total 3,969,000 net tons. Building requirements are the largest. The general building classification, as previously described, normally accounts for approximately 1,098,000 net tons of structural shapes a year. Car and locomotive construction normally accounts for 752,000 net tons; shipbuilding for 248,000 net tons; the automotive field for 418,000 net tons; manufacturing machinery and tools for some 136,000 net tons; oil, gas and water development work for 120,000 net tons; agricultural implements and tools for some 43,000 net tons; lumbering for 500 tons; mining for 6000 tons, and the package industry for 300 tons. Some 53,000 net tons of shapes normally is absorbed each year by the railroads, exclusive of their building requirements. Jobbers annually distribute something like 303,000 tons, and in addition about 792,000 net tons of shapes is employed for a large variety of purposes not important enough to group singly.

A normal year's business in this country should require approximately 5,160,450 net tons of plates to meet domestic requirements. Car and locomotive construction alone normally absorbed 1,372,000 net tons of this total. Oil, gas and water development comes second, accounting for 939,000 tons of plates and 325,000 tons of skelp. The automotive field comes next, with 701,000 tons. Shipbuilding under normal conditions would take 633,000 tons; building requirements about 486,000; the manufacture of machinery and tools, about 278,000 tons, and the railroads, apart from car and locomotive construction, 106,000 tons.

Steel bar requirements of the country should aggregate approximately 7,016,800 net tons per year. The bar production comprises a little more than 20 per cent of the entire finished steel output. The largest single user of steel bars is the general automotive industry, on which the steel bar makers normally rely for a business of 1,644,000 net tons a year. For manufacturing machinery and hand tools, 1,132,000 tons are taken normally. The general building industry should account for 1,023,000 tons; car and locomotive construction, for about 511,000 tons; agricultural implements and tools, for 422,000 tons; the development and production of oil, gas and water, for 311,000 tons, and the railroads, for miscellaneous purposes outside of car and locomotive building, for 191,000 tons.

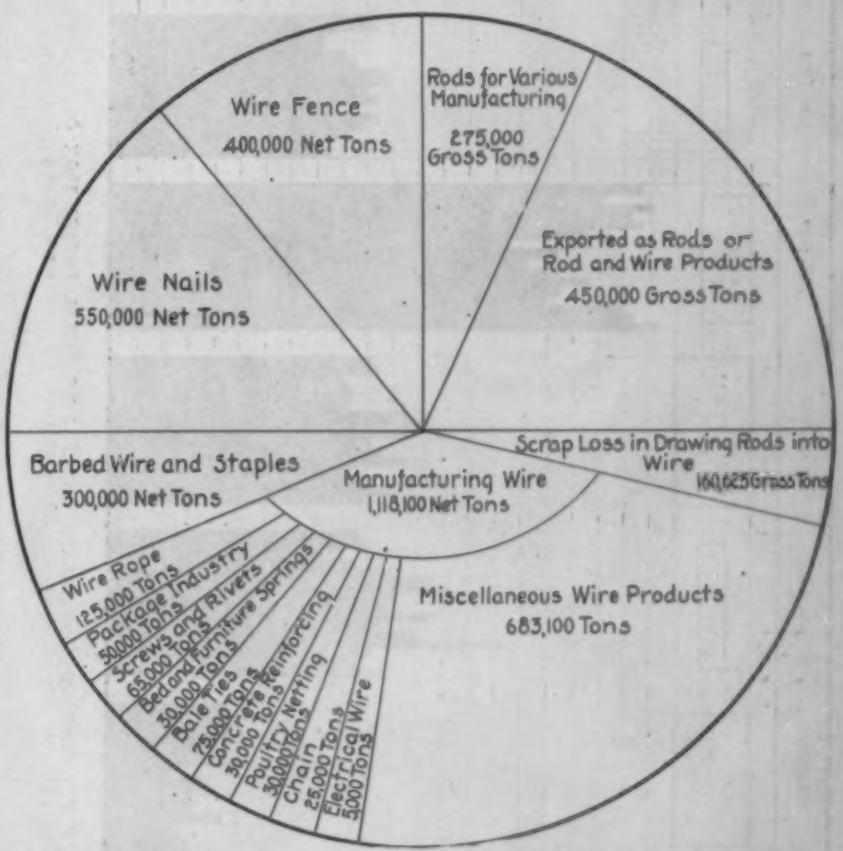
Normal standard rail requirements of the railroads of this country now are calculated as 1,713,000 gross tons a year. About 130,800 gross tons of standard rails is distributed to other buyers.

Of the total normal light rail requirements of 279,820 gross tons a year, by far the greater portion, 195,600 tons, goes to the mining industry. The car and locomotive constructive field absorbs normally 500,000 net tons of axles, wheels and forgings per year and in addition the railroads take direct 155,000 tons of axles, wheels and forgings. Details as to the normal consumption and distribution of these and other heavy rolled finished products are set forth in the table on page 51.

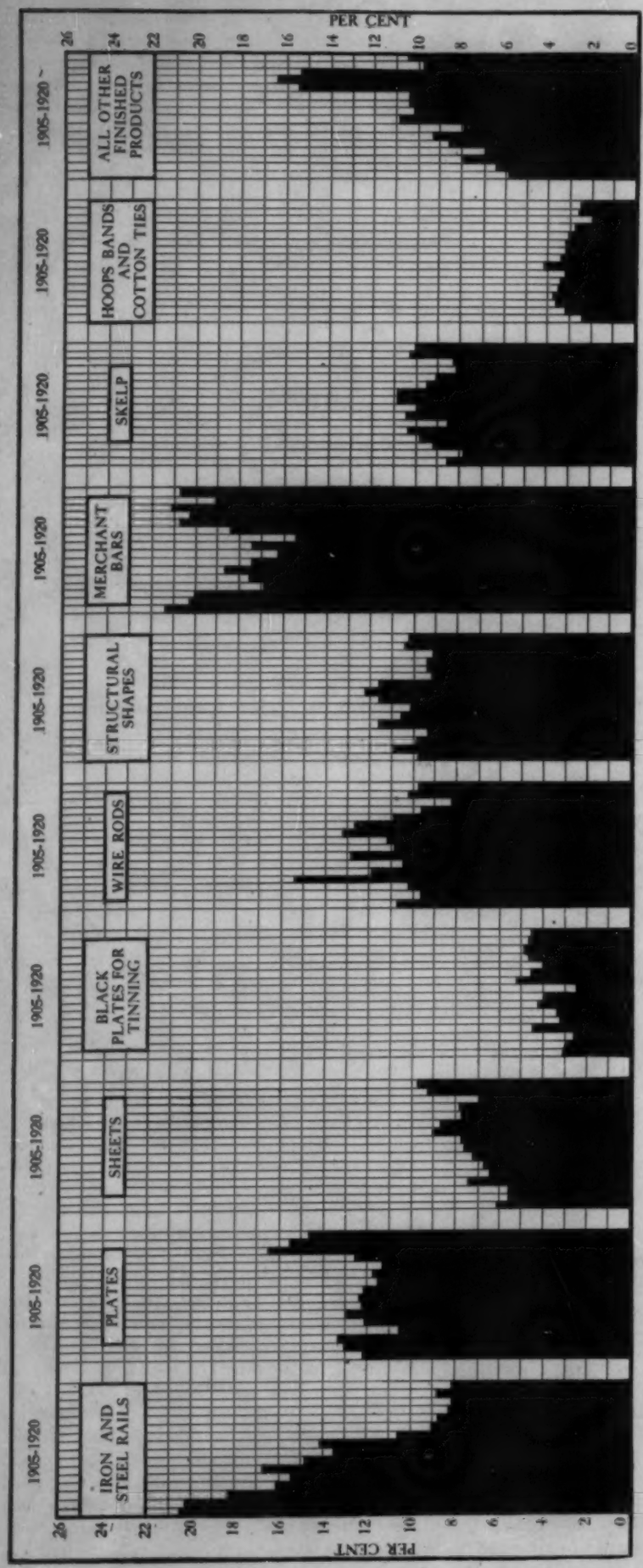
Tin plate now comprises a larger percentage of the finished steel output in recent years than formerly was the case. This is due principally to the concentration of the population of the United States in cities and the consequent demand for canned goods, and also to the improvements in canning methods which have been developed by the National Canners association.

A statement issued by the food administration during the war showed that 70 per cent of the 1,600,000 net tons of tin plate normally manufactured in this country is used for food containers. This statement classified packers' cans for "fruits and vegetables, fish, milk, meats, spaghetti and macaroni, hominy, kraut, soups, syrups and molasses, baked beans, tea, coffee and coffee substitutes, spices and cocoa, baking powder, lard, butter and compounds and crackers."

Manufacturers of tin plate say that for a period of 20 years there has been an average increase in the pack of fruits and vegetables of 10 to 15 per cent, depending on nature and market conditions, and on the development of new canned products. The use of tin plate for food containers received a great stimulus from the war. For many months condensed and evaporated milk in cans formed the principal food of the people in northern France and Belgium. The output of canned milk as a result of the removal of prejudice against its use, and also, to a greater extent, to the high cost of sweet milk, was expected in 1921 to show a material increase over the average prewar consumption.



A NORMAL YEAR'S OUTPUT OF 3,000,000 GROSS TONS OF WIRE RODS REACHES THE MARKET IN THE FORM AND DEGREE SHOWN BY THIS CHART



PERCENTAGE OF THE INDIVIDUAL OUTPUTS OF LEADING FINISHED ROLLED STEEL PRODUCTS TO TOTAL PRODUCTION OF FINISHED ROLLED STEEL IN THE UNITED STATES ARE SHOWN ANNUALLY FOR A PERIOD OF SIXTEEN YEARS

Salad and cooking oils are good examples of comparatively new products which now are canned in large volume. Formerly only pink salmon was marketed but now all varieties are canned.

Other uses of tin plate not classified as for food containers involve the packing of cigars, tobacco and cigarettes, paints and varnishes, toilet articles, drug, shoe, stove and metal polishes, oils and greases, and the manufacture of bottle and jar caps, furnace pipe, stove boards, cooking utensils, typewriter ribbon boxes and spools. It is estimated that the production of bottle caps annually accounts for 60,000 tons. The use of tin plate for packing oil is growing tremendously. The automobile industry has been responsible for a large growth in the use of tinned oils and greases. Package oil shipments to China and Japan, as well as other destinations, are increasing.

One use of tin plate has shown a big decrease in proportion to the growth in other directions. This is its use for roofing. In this direction the trend is downward owing to the development of cheap roofing materials, many of which can be put on without any necessity for skill.

Distribution of Tubular Goods

Approximately one half of the tonnage of tubular goods produced in this country is used in the production and distribution of oil, gas and water. In addition, large tonnages are employed for the distribution of steam, gas, water and electricity in buildings. Large quantities are used for the construction of railroad and other boilers, and large quantities are used in railroad car construction in distributing steam for heating, and gas and electricity for lighting, and for air brakes. Large quantities also are used by the railroads in their signal installations. In building operations, pipe is used in foundations and for the distribution of steam, water, gas and electricity in the superstructures. Tubular goods also to a large extent are used in place of other rolled steel shapes in the manufacture of vehicles, agricultural implements, bedsteads, etc.

Development of new uses for tubular goods have been few as compared with those for other rolled steel products. One of them is conduit pipe, an increasing quantity of which is being marketed, as a result of the wider use of electricity.

Jobbers distribute about 50 per cent of the steel tubular production. It is the general policy of the tube manufacturers to distribute all of the product through jobbers that can be handled in that way.

No finished steel product has increased its percentage of the entire rolled steel output to as large an extent as have

sheets. Where sheets comprised 5.5 to 7.7 per cent of the entire rolled steel output over the period 1905 to 1913, inclusive, they now are close to 10 per cent. It is expected that production figures for 1922 will show an even larger percentage for sheets. There are several reasons for this tendency. In the first place, the depletion of timber resources is stimulating the replacement of wood by steel for a great many uses. Secondly, the ability of the steelmakers to produce sheets of required adaptability, and the ability of the die manufacturers to develop and produce required equipment, constantly are making it possible to find new outlets for sheets.

Present capacity for producing sheets of all kinds is rated at 3,140,000 net tons. But this figure, as compared with production figures of one or two decades ago, does not adequately measure the increased use of sheets. The automobile industry at first used heavier gages but demand for lighter construction, and consequent developments in the heat treatment of steel have resulted in the production and use of lighter gages without loss of strength.

The largest outlet for steel sheets is in connection with a host of uses identified with the building industry. The next outlet is the automotive industry. The third outlet is in connection with stoves and ranges; sheets not only are used on a large scale in the manufacture of stoves and ranges, but also in large volume in the production of stove pipe and elbows, furnace pipe and furnace casings. It may be said generally that the increasing use of sheet steel is due largely to its replacement of wood and castings for a wide variety of purposes. For instance, expanded metal is succeeding wood lath to a large extent. Railroad and street car roofs and trimmings are being made of sheets on a rapidly increasing scale. There has been a larger development in the manufacture of steel lockers, filing cabinets, steel furniture, refrigerators and enamelware, and utensils. The use of steel sheets for coffins and grave vaults is increasing rapidly. Tanks, hog troughs and watering troughs which formerly were made largely of wood or stone, now are made of sheets. An increasing tonnage is being manufactured into metal shingles.

The manufacture on a large scale of tanks in which gasoline is distributed to the farmers has resulted from the development of automotive equipment. Quantities are used in connection with the installation of gasoline stations. Galvanized sheets are being used to an increasing extent in the manufacture of silos and flumes. An increasing quantity is being used in the electrical industry in the manufacture of transformers and for other purposes.

Jobbers distribute 7 to 10 per cent of the sheet and tin plates consumed in this country, which compares with about 25 per cent some 25 years ago. This shrinkage has resulted from the increase in the number of sheet manufacturers, who to secure an outlet for their product, have broken through the ties between the jobbers and older manufacturers by selling to consumers direct.

The total capacity of the bridge and structural fabricating shops of the country is considered as 2,640,000 net tons a year. Approximately one-third of the fabricated output goes into railroad work, including bridges, viaducts, trestles, buildings of various kinds and for diversified purposes, turntables, etc. The remaining two-thirds goes into factory buildings for general manufacturing industries; into private building projects, mainly loft, hotel and office buildings; into public utilities, in the form of car barns, boiler shops and transmission towers; and into municipal work, including bridges, subway and elevated structures, buildings, etc.

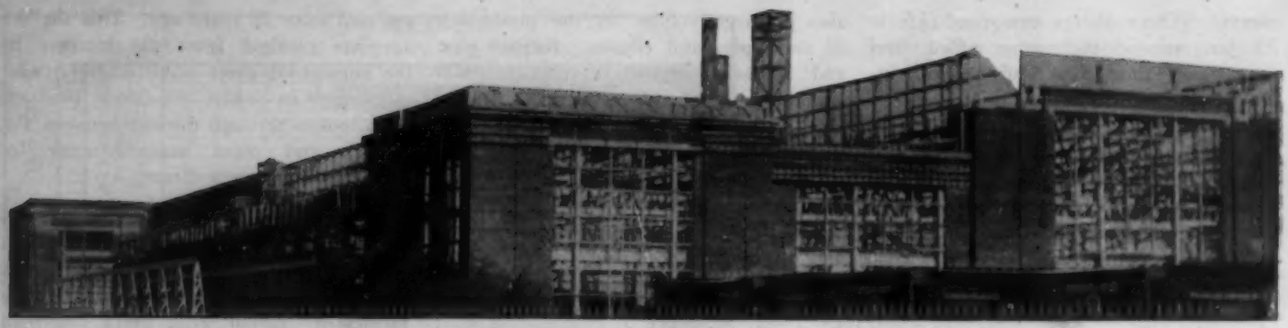
In subnormal times, such as the present, the tonnage of railroad work is smaller than 33 1/3 per cent of the total, and the percentage of light building work is larger. Among the new outlets for fabricated steel is the manufacture of steel barges. This is being done on an increasing scale in connection with the developmet of waterways. An increasing amount of business also is developing in connection with transmission towers.

Normal Yearly Requirements of Leading Rolled Products

Classified By Principal Consuming Industries

	NET TONS							GROSS TONS						
	Structural shapes	Plates	Bars and shapes under 3-inch	Bands	Hoops	Cotton ties	Total	Heavy rails	Light rails	Splices	Cross ties	Track special ties	Spikes	Total
Agricultural implements, tools and supplies	43,000	58,000	422,000	21,500	8,300	....	552,800	....	20	....	...	....	4,200	4,220
Automobiles and motor vehicles and accessories	418,000	701,000	1,644,000	254,000	26,700	....	3,043,700	600	....	....	...	....	....	600
Bolts, nuts, rivets and screws	40	2,000	645,000	5,000	5,100	....	657,140	....	....	....	...	....	....	.....
Buildings, building equipment and supplies and requirements of building material manufacturers	1,098,000	486,000	1,023,000	35,800	20,500	....	2,663,300	2,900	3,300	430	100	70	430	7,130
Car and locomotive construction	752,000	1,372,000	511,000	12,000	700	....	2,647,700	200	3,700	600	600	5	3,600	8,705
Handled by jobbers	303,000	162,000	664,000	53,700	48,400	....	1,236,100	66,000	29,700	7,200	250	1,300	13,400	117,850
Lumbering equipment and supplies	500	150	800	250	500	....	2,200	15,100	11,200	2,000	5	220	1,600	30,125
Machinery and hand tools	136,000	278,000	1,132,000	15,500	11,900	....	1,573,400	10,100	10,300	1,600	270	390	3,000	25,660
Mining	6,000	3,300	7,500	2,500	2,500	300	22,100	24,500	195,600	16,100	3200	190	8,400	247,990
Oil, gas and water development	120,000	939,000	311,000	17,700	38,200	....	1,425,900	3,800	5,000	660	...	2,200	230	11,890
Packages	300	10,000	42,500	5,700	121,000	68,000	247,500	....	....	....	...	....	....	.....
Rails and track supplies	33,000	106,000	191,000	1,400	70,100	20	421,520	1,713,000	14,100	111,400	2700	77,200	37,900	1,956,300
Shipbuilding	248,000	633,000	65,000	300	100	....	946,400	....	....	....	...	....	270	270
Miscellaneous	792,000	410,000	358,000	139,300	91,400	....	1,790,700	7,700	6,900	99,300	350	9,600	75,100	198,950
Total	3,969,800	5,160,450	7,016,800	569,650	445,400	68,320	17,230,400	1,843,800	279,820	239,290	7475	91,175	148,130	2,609,690

Classified requirements of sheets, tin plate, wire products and tubular goods not ascertainable. Nor do the figures include 720,000 net tons of axles, wheels and circular and other railroad forgings and other miscellaneous rolled products. The plate figures given in the table include some tonnage used for the making of welded pipe.



Some large projects were undertaken during the year and pushed to completion

Factory Building Program Large

Contemplated Industrial Construction Projects Are Numerous—1921 Activity Was Restricted to Actual Needs Which Were Small—Lack of Demand and High Prices Were the Chief Hindrances to Plant Expansion

BY WILLIAM M. ROONEY

EVENTS of 1921 have demonstrated that the reconstruction of business and industry on a sound basis will be slow. Production and sales in many markets still are at a low ebb, but prospects for their recovery are bright, brighter, perhaps, than surface indications show.

In the period from 1914 to 1920, orders came easy, money was plentiful and prosperity was experienced on every hand. Deflation came upon the country suddenly, plunging business into the depths of an acute depression. The shock was severe, but since late summer a slight improvement has been noticeable, and now, on the threshold of the new year, slow but positive recovery seems assured.

The actual extent of the depression is clearly shown in the figures on awards for the erection of industrial structures during the year compiled by the F. W. Dodge Co., New York. The total awards from Jan. 1 to Dec. 1, in the entire district covered by the Dodge company statistics, were valued at approximately $158,772,600, compared with $595,000,000 in 1920 and $528,000,000 in 1919. Thus it is to be seen that awards for 1921 approximately were only 26 per cent of the amounts expended on industrial construction in each of the two preceding years. The reason for this decline is obvious. The need of new factory buildings was at a minimum and those already erected more than sufficed for the demands of production. When it is considered that in general existing factory capacity was called upon for less than half its total floor space, it is surprising that contracts for as much additional space as is represented in $158,000,000 were awarded.

It is interesting to note the individual awards by industries during the year, compared with those of 1919 and 1920. As in preceding years awards for metalworking buildings led all other classes, totaling $28,436,800, which compares with $160,000,000 in 1920 and $170,000,000 in 1919. Miscellaneous structural awards were valued at $34.909,900, as against $145,000,000 in 1920 and $80,000,000 in 1919. Buildings devoted to producing food and food products cost $26,323,000, as compared with $50,000,000 in the preceding year and $60,000,000 in 1919. Textile building awards in 1921 were valued at $9,763,000, compared with $35,000,000 in 1920 and $48,000,000 in the preceding year. These figures clearly reflect the depression in the textile industry.

The rubber working industry was hit harder than any other branch. Awards for structures in this field totaled only $2,651,500 as compared with $45,000,000 in 1920 and $35,000,000 in 1919. Awards for oil mills, refineries, etc. showed the depressed state of industry in this field, being only $3,114,700 as against $18,000,000 in 1920 and $20,000,000 in 1919. Awards in the chemical industry also were extremely low, being only $3,623,300, compared with $20,000,000 in the year preceding and $25,000,000 in 1919. Building awards in the woodworking industry during the 11 months were valued at $6,266,600, while in 1920 and 1919 the figures were $18,000,000 and $22,000,000 respectively. Paper and pulp mill awards in 1921 totaled $5,414,000, compared with $30,000,000 in 1920 and $20,000,000 in 1919. Approximately $16,000,000 was the valuation of awards in 1921 for power plants and central heating stations, compared with $35,000,000 and $20,000,000 in 1920 and 1919. Only $2,147,700 was awarded for structures in the leather and allied field during the year, in comparison with $4,000,000 in the preceding year. Awards in the mining, quarrying and allied fields show less percentage of drop than those of any other. In the past year these totaled $13,318,000, as compared with $18,000,000 in 1920 and $8,000,000 in 1919. Printing, binding, etc., awards were valued at $4,185,000, which compares with $8,000,000 in 1920 and $5,000,000 in 1919. Total awards in the glassworking industry were valued at $1,615,000, while in 1920 awards in this field were valued at approximately $9,000,000 and in 1919, at $4,000,000.

These figures reflect the depression of business and industry in 1921, but comparisons in square feet of floor space indicate the decline even more clearly. Total industrial floor space contracted for in 1919 was 1,368,500,000; in 1920 this figure was topped by about 28,000,000 square feet, awards for that year totaling 1,662,000,000. In 1921, however, a tremendous drop was recorded as compared with awards for the preceding two years. Approximately 32,975,200 square feet of floor space was contracted for up to Dec. 1, a drop of approximately 1,335,524,800 square feet compared with 1919 and 1,629,024,800 with 1920.

Awards in square feet in 1921 in

the various industries were: Metalworking, 6,119,300; textile, 2,554,000; power and central heating plants, etc., 813,000,000; rubber, 767,000; chemical, 888,300; food products, 6,447,500; oil mills, refineries, etc., 330,500; mining and quarrying, 2,307,200; leather, 754,800; glass, 357,700; paper and pulp, 1,216,700; printing and binding, 754,100 and woodworking, 1,823,300 square feet.

Returns to the Dodge company show that up to Dec. 1, contracts were awarded on 2998 individual projects, which compares with 5853 in 1920. These were divided as follows: Metalworking, 484, compared with 1377 in 1920; food, 667, compared with 825; textile, 203, compared with 383; rubber, 39, compared with 123; oil, 47, compared with 103; power plants, 105, compared with 145; chemical, 127 compared with 233; mining and quarrying, 150, compared with 187; leather, 55, compared with 89; glass, 22, compared with 44; paper and pulp, 26, compared with 188; printing and binding, 80, compared with 120; woodworking, 185, compared with 237; and miscellaneous industrial projects 755, compared with 1799.

While undoubtedly the principal reason for the sharp drop in industrial construction during the past year can be laid to the slack demand for products of all kinds, in a measure the high cost of materials and general construction, has been responsible, and receives some of the blame from construction authorities. The buyers' strike, from the ultimate consumer of manufactured goods, spread to the maker as soon as the demand fell off and this resulted in a lessening in demand for factory buildings. When consumers of metal products, food, clothes, etc., demanded lower prices and tightened the strings on their money bags, the manufacturers likewise curtailed their expenditures and informed the construction industry that factory building needs would be extremely limited until prices were brought somewhere within reason. In addition, manufacturers who were fortunate enough to have a fair demand for their products and were in a position to build, were hindered from doing so by the banks. These institutions would not loan money, except at high rates, for any building construction undertaking, letting it be known that building material prices were too high and were in line for a sharp decline, before the end of the year.

Building Material Prices Fall

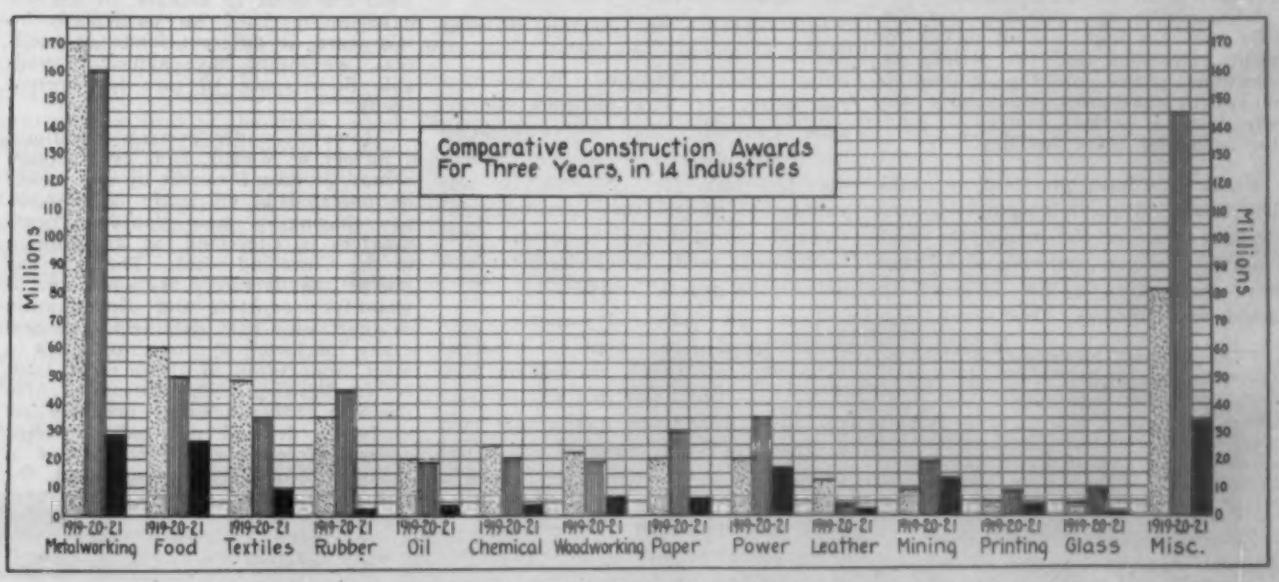
The prediction of the bankers was carried out; building material prices did fall, and in fact, are still falling. Authorities on building material differ on the reduction in the various products due to the fact no set of figures can be accepted as reflecting conditions in all sections of the country. However the following, which are fairly authoritative show the percentage of reduction since the peak of prices: Hollow building tile, 35 per cent; insulation board, 20 per cent; plumbing and plumbing supplies, 25 and 35 per cent; paints and oils, 25 and 60 per cent; brick, 32 to 42 per cent; flooring, 50 per cent; cement, more than 33 per cent; gas and electrical fixtures, 37 per cent; roofing materials, 32 to 35 per cent; glass, 25 per cent; lumber, 40 per cent; lath and plaster, 45 per cent; millwork, 25 per cent; and structural steel 50 per cent.

From these figures it can be seen that liquidation of prices in the building industry have been fair. However, further reductions are looked for and contractors and engineers are frank in stating they expect prices on some materials to go lower than they are at present.

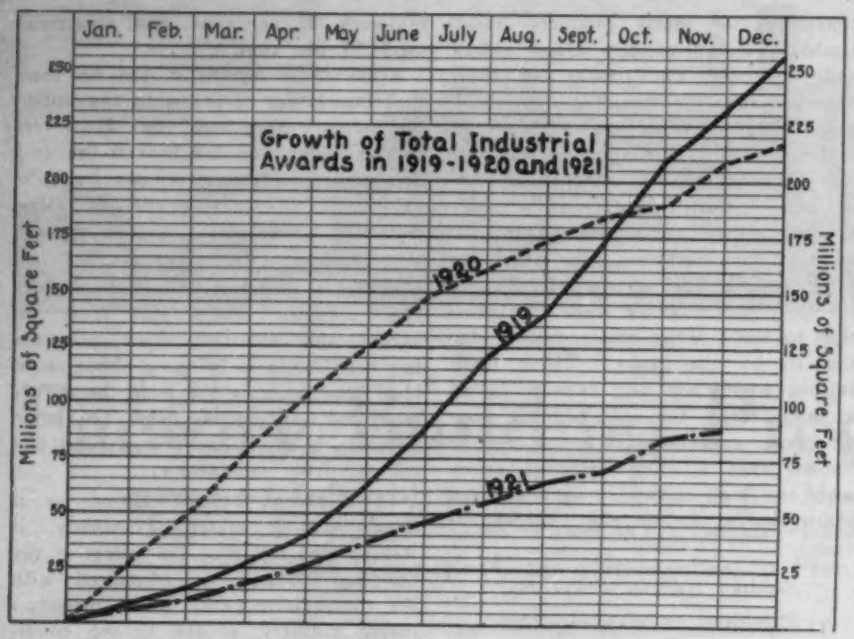
Problems are confronting the construction industry which still must be solved and although some progress has been made in bringing about more ideal conditions, in the main the movement has only been started. The labor situation is much easier at present but still far from satisfactory.

In a recent bulletin issued by a large building material company, it was pointed out that the unrest in the building industry, as compared with the comparative peace in the manufacturing industry, is due to the conditions under which the building industry is conducted. The chief cause of the unrest is due to the seasonal character of the work. Construction work in the summer months is cheaper than the same operations in the winter, and consequently owners generally let their contracts in the spring. As a result labor and wage agreements are made after contracts have been let, and consequently uncertainty is fostered and both the owner and the contractor hesitate to sign contracts unil wages have been fixed. This intensifies the seasonal tendency of the work. As a result construction labor is largely idle in the winter and contractors must earn their winter overhead costs during the summer.

This results in the difference in cost between winter and summer building.



THE TREMENDOUS DROP IN INDUSTRIAL CONSTRUCTION AWARDS IN 1921 AS COMPARED WITH THE TWO PRECEDING YEARS IS CLEARLY SHOWN



THE SLUMP IN INDUSTRIAL BUILDING AWARDS IS TREMENDOUS WHEN COMPARED IN SQUARE FEET

If costs at both seasons could be equalized to the owner, building could be made an all-year work; the employer could retain his organization; the workers could keep their jobs and everyone interested in the industry would be benefitted.

Speaking of the industrial construction field in 1921, H. K. Ferguson, president of the H. K. Ferguson Co., Cleveland, engineer and builder says:

"Granting the lack of motive for increase in factory construction as being of prime importance, I feel that the high cost of materials and labor, coupled with the considerable amount of publicity given to the various rapid decreases in the cost of these items, has made everyone suspicious of the advisability of buying buildings.

"A contributing cause has undoubtedly been the high cost of money for plant extensions and the serious restrictions placed on the lending of money by the banks, which have usually been a normal source of funds for industrial plant building."

Frank D. Chase, president of Frank D. Chase, Inc., Chicago, engineer, declares that in the main, the high costs of building materials and wages were responsible for the slackened demand for buildings. He says:

"The greatest hindrance to the construction of industrial buildings in 1921 was the high prices for both labor and material. Labor, material men and capital were profiteering and exploiting the investor; naturally there has been little or no building under these conditions."

In commenting on the drop in industrial construction projects during the year, George S. Mills, of Mills, Rhines, Bellman & Nordhoff, Toledo, O., engineers, has the following to say:

"A postwar reaction from high wages, high prices and reckless spending and buying, resulting in almost a cessation of manufacturing in many lines, was the greatest hindrance to industrial building construction in 1921. In the latter half of the year prices had been reduced to a great extent, but public confidence was not sufficiently restored and has not yet reached the point of buying. Manufacturers who have resumed operations and who are actually in need of additional space, hesitate to build because they are not quite sure that they are getting the best possible prices for materials. In the course of the year's activities our company has discussed new buildings with a great number of concerns and this attitude is general throughout the entire Middle West."

It is obvious that building material and construction costs were contributing factors to the slump in construction work. It is a foregone conclusion, therefore, that unless building costs are lowered to a point where manufacturers feel it will be advantageous to erect new structures, industrial construction programs will be limited, even though business and industry in general revive.

That new industrial structures are needed none of the country's industrial authorities will deny. Prominent men in all lines, point out that the successful manufacturer of the future will be the one who can produce the best product at the cheapest price. As a rule, this cannot be done in obsolete buildings efficiently. Commenting on over-expansion, Mr. Chase analyzes the situation as follows:

"There are few, if any, lines of industry in this country in which there are too many factories. It is so claimed, however, but on this point I do not agree and I look for immediate resumption, in a small way, of construction of new industrial plants.

"Both the Bethlehem Steel Corp. and the United States Steel Corp. are spending large sums, not as popularly supposed as unusual measures for taking care of unusual business, or to employ labor from a philanthropical standpoint. These enlargements are merely the normal increase, or less than the normal increase, in plant expansion of these corporations. Anyone familiar with the annual reports of these corporations for years past will appreciate this fact. The steel manufacturers anticipate a normal increase in business due to the normal growth of the country and its requirements.

"A few industries increased their facilities largely during the war. Among these may be mentioned the foundry industry, including malleable, gray iron and steel. At the present there is an abundance of foundry capacity and this industry is one which need not look for large expansion. The automobile industry has unquestionably developed manufacturing facilities which will be in excess of production requirements for years to come and the same is true of tire manufacturing plants. Of the thousand other industries in this country, I know none which has plant capacity in excess of normal requirements and there are industries far exceeding in value the production of the steel industry of this country, in which we may anticipate large expansion."

Mr. Ferguson points out that over-expansion is not a mere matter of total floor area. He says:

"As to possible over-expansion in the matter of factory buildings, I am inclined to believe that if factories were mobile or readily transferable from one point to another, or did not have to be fitted up particularly to take care of different kinds of products, we might have sufficient available floor space to care for present needs.

"However, under present conditions, a factory at Muncie, Ind., even though it may be vacant, cannot by any means be operated as efficiently by a company having its main plant and headquarters in Cleveland, as an addition to the Cleveland plant. The war has taught manufacturers the advantage of quantity production and concentration of supervision very definitely. The necessity for lowering production costs to meet competition at the present time, is emphasizing these lessons. Also the fact that peace-time products are likely to demand not only different equipment but also different types of factories from those established for war work, will have an important bearing on the situation."

That industry has over-expanded in the matter of factory buildings in some localities and not in others, is the

opinion of Mr. Mills, who writes:

"Industry has over-expanded in the matter of factories in certain localities and not in others. For instance, Detroit has hundreds of thousands of square feet of available factory floor space which can be rented or purchased at extremely low cost, because during the war Detroit did overexpand in the matter of factory buildings. The demand for factory buildings in 1921, which also indicates what it will be in the future, has been from the smaller cities and towns. I believe for the next few years the smaller manufacturers or large manufacturers located in small industrial centers, will show greater development and require more buildings than manufacturers who are grouped together in large industrial centers, such as Detroit, Chicago, Pittsburgh or Philadelphia. The freight situation has a bearing on this matter and many of the large manufacturing concerns have already started to locate small plants throughout the country for local distribution of their products to avoid high freight costs on finished products."

These men, who are among the foremost construction engineers of the country, are confident of a better demand for factory space in 1922. Mr. Chase states that in the last few weeks of 1921 the activity in his business indicated a gradual resumption and increase in business activities. Mr. Ferguson is of the opinion that resumption of production on a normal scale will tend to revive factory construction and he points out that in the last two months of the old year, signs of life in this direction were plainly to be seen. In addition he stated that as manufacturers resumed operations on a normal, or nearly normal scale, it was evident that almost everyone had something in mind in the construction line, which he planned to put into execution as soon as business conditions warrant.

Undoubtedly there will be a demand for factory buildings in 1922 in excess of 1921. Contemplated industrial construction that is, buildings which have been planned or indefinitely postponed during the year amounts to $401,143,800. This is the estimated value of 4789 industrial projects which have been planned and on which construction will eventually be undertaken. This is divided as follows: In the metalworking field contemplated projects amount to 705 valued at $105,747,500; in food products, 1086 valued at $50,001,800; textile, 293 projects valued at $18,924,500; rubber working, 45 projects valued at $3,607,000; oil, 70 projects valued at $13,919,000; power plants, 214 valued at $54,114,900; chemical plants, 204 valued at $14,235,800; mining and quarrying, 282 projects valued at $21,849,900; leather, 109 projects valued at $5,188,000; paper and pulp mills, 82 projects valued at $22,581,000; glass, 33 projects valued at $2,180,500; printing and binding, 132 projects valued at $10,447,900; and woodworking, 286 projects valued at $10,679,800. In addition to these there are 1240 contemplated projects on miscellaneous industrial construction valued at approximately $67,631,000.

These figures show that despite the adverse condition of industry in 1921, manufacturers have not lost sight of the fact modern factories will be needed when normal demand returns. There is sufficient contemplated industrial construction work to keep the structural firms of the country working at capacity all through 1922. Undoubtedly some of these projects will be abandoned, but on the other hand new ones are being planned each day and added to the already large number which eventually will turn into actual awards some time in the future.

Continuous processes of manufacture are demanded under present industrial conditions. Plant layout is of first importance in any manufacturing operation. Conveying apparatus and labor-saving machinery are demanded in the new order of production and these require modern buildings. Factory structures must be built to support cranes, monorail systems, tramrail systems, etc. Wide aisles must be provided for other conveying and transporting equipment, such as tractors and trailers. Plenty of day light is necessary to good workmanship. In addition plants must be compact. Floor space must be utilized to its greatest extent through the arranging and grouping of machinery. Poles and other obstructions, so generally found in old structures, must be reduced to a minimum and in fact the entire structure must be modern in every respect so as to provide for continuous process manufacture under the most ideal working conditions. The factory building of the future will be the main cog in the wheel of volume production.

Labor probably is as efficient today as it will be for some time. Wages may fall further, but not much, and it therefore is obvious that other means must be found to produce goods at low prices. The answer of course is the greater utilization of labor-saving machinery and the adoption of methods for successive processes of manufacture. In many existing factory buildings it is impossible to rearrange tools and machines to suit continuous process manufacture, due to the layout of the buildings. At the least, remodeling of such structures will be necessary and in many cases, it will be more economical if new buildings are erected. However, in some cases the remodeling of factory buildings will be comparatively easy and will suffice for the demands to be made upon them.

In contemplating activity in industrial construction for 1922, one factor stands out as a real menace to the programs which have been laid out. Material prices have come down, wages are within reason and business is on the mend, but rail rates remain high. The cost of shipping materials was almost prohibitive during the past year and it must be remembered that construction materials in many instances must be shipped long distances. It is a foregone conclusion that unless some reduction in freight rates is made the building industry will suffer severely. However, indications at the present moment point to an early adjustment of rates.

However, until industry and business have attained a more stable position than at present exists industrial construction projects will be limited to actual needs, and it is safe to state that these will be few. No one can accurately state just how long it will take the industrial world to get back to normal, but those who are well informed look for a betterment in business and industry in 1922.

MODERN PLANTS MUST REPLACE MANY EXISTING FACTORIES WHICH ARE OBSOLETE

Iron Output Lowest since 1908

Year's Total Is 16,498,400 Tons—December Production, However, Increases 219,653 Tons to 1,634,611 Tons or Best Month since February—124 Furnaces Blowing at Year End, Gain of Four

WITH a total of 1,634,611 gross tons of coke and anthracite pig iron produced in December, the output for 1921 aggregated 16,498,400 tons. This is a loss of 19,902,568 tons from the 36,400,968-ton output of 1920, representing a reduction of 55 per cent. During the second half of 1921 7,089,357 tons were produced as against 9,409,043 tons during the first half. The output of December was a gain of 219,653 tons over the 1,414,958 tons of November.

As compared with the increased furnace activity shown during November, little improvement was made in December. On the last day of the month

MONTHLY PRODUCTION

	1921	1920	1919
January	2,414,753	3,012,373	3,306,279
February	1,929,394	2,984,257	2,943,347
March	1,594,866	3,375,768	3,088,023
April	1,190,751	2,752,670	2,474,374
May	1,215,272	2,991,825	2,107,729
June	1,064,007	3,046,623	2,114,028
Total 1st half.	9,409,043	18,163,516	16,037,988
July	864,642	3,043,918	2,424,212
August	954,901	3,145,536	2,742,081
September	985,795	3,124,308	2,480,790
October	1,234,450	3,288,341	1,864,424
November	1,414,958	2,935,081	2,407,369
December	1,634,611	2,700,268	2,626,074
Total 2nd half.	7,089,357	18,237,452	14,544,950
Grand total.	16,498,400	36,400,968	30,578,730

124 stacks were operating as compared with 120 on Nov. 30.

The total output of merchant pig iron during December was 368,274 tons, a gain of 63,739 tons over the 304,535 tons of the previous month. On an average daily basis this represented 11,879 tons per day or 1728 tons more than the daily average of 10,151 tons for November. Steelworks and nonmerchant furnaces produced 1,266,337 tons which, compared with the 1,110,423 tons of the previous month, was a gain of 155,914 tons. Reduced to an average daily basis the December figure represented 40,850 tons per day as against the daily rate of 37,014 tons in November, an increase of 3836 tons.

The total daily rate of pig iron production for December was 52,729 tons per day. As compared with the 47,165 tons of November, this was a gain of 5564 tons or 11.8 per cent.

On the last day of December 124 blast furnaces were operating, this being a gain of four over the number active on Nov. 30. During the month four merchant furnaces were blown in and none blown out, while three nonmerchant furnaces were blown in

AVERAGE DAILY PRODUCTION

	1921	1920	1919	1918	1917
Jan.	77,895	97,172	106,654	77,523	101,930
Feb.	68,906	102,904	105,270	82,794	94,641
Mar.	51,447	108,895	99,614	103,548	105,026
Apl.	39,691	91,754	82,479	109,112	110,936
May	39,202	96,510	67,991	111,351	110,119
June	35,466	101,533	70,467	110,538	108,675
July	27,892	98,190	78,200	109,954	107,659
Aug.	30,802	101,468	88,453	108,983	104,483
Sept.	32,857	104,143	82,692	113,774	104,691
Oct.	39,821	106,075	60,142	112,335	106,332
Nov.	47,165	97,836	80,244	111,595	106,620
Dec.	52,729	87,105	84,711	110,602	93,077
Ave.	45,201	99,456	83,910	105,290	104,502

and three blown out. Thus, the total net gain was four stacks. Of the total number of stacks active the last day of the year, 38 were merchant and 86 nonmerchant. On the last day of the month, the Steel corporation was operating 52 furnaces, the same as on the last day of November.

Fifty tons of spiegeleisen were produced in December while none was produced in November. Ferromanganese totaled 3915 tons and was a gain of 390 tons over the 3525 tons produced during the previous month.

Buys Coke Tonnage

Pittsburgh, Jan. 3.—A contract for approximately 18,000 tons of furnace coke monthly for the first half of 1922 has been closed by the Trumbull-Cliffs Furnace Co., Warren, O. By-product coke was taken from a valley steel works at $3.20 Connellsville. The new furnace which has a capacity of 600 tons daily will blow in Jan. 16. In addition to the basic iron which this furnace will furnish to the Trumbull Steel Co., a part owner, considerable surplus tonnage will be available for the open market.

Iron Sales in South

Birmingham, Jan. 3. (By Wire)—Some good sized sales of foundry iron are being made in this district. One company alone disposed of an excess of 10,000 tons in the week. Included in this amount was the joining up of some new tonnage at the present market with some high-priced iron which the particular buyers had not yet taken out. The southern market remains at $16.50 for the sizable orders and at $17 on smaller lots.

DIVISIONS OF PRODUCTION

1920	Merchant	Non-merchant	Spiegel	Ferromanganese	Other ferro
Jan.	716,574	2,267,747	5,903	18,054	4,095
Feb.	735,707	2,215,079	11,755	18,015	3,701
Mar.	863,167	2,474,018	15,472	19,203	3,908
Apl.	761,331	1,958,535	6,600	18,036	8,168
May	808,751	2,140,346	10,744	21,536	10,448
June	769,236	2,233,565	8,510	26,870	8,442
July	791,440	2,209,128	6,925	28,347	8,078
Aug.	823,495	2,276,433	8,333	28,642	8,633
Sept.	798,111	2,277,607	11,849	27,697	9,044
Oct.	818,166	2,430,656	9,000	25,786	4,733
Nov.	705,014	2,190,217	11,006	23,298	5,546
Dec.	586,466	2,076,693	4,587	28,112	4,410
Tot'l	9,177,458	26,750,024	110,684	283,596	79,206
1921					
Jan.	474,135	1,940,618	2,542	20,960	4,950
Feb.	338,383	1,591,011	11,566	17,447	4,067
Mar.	276,559	1,318,307	19,746	17,682	3,222
Apl.	238,539	952,212	14,744	13,266	3,163
May	215,703	999,569	2,379	6,853	4,553
June	178,854	885,153	....	4,536	6,090
July	141,326	723,316	4,015	1,509	3,178
Aug.	134,491	820,410	....	3,878	....
Sept.	157,728	828,067	....	3,289	35
Oct.	218,990	1,015,460	....	3,902	990
Dec.	368,274	1,266,337	50	3,915	1,064
Tot'l	3,047,517	13,450,883	181,042	100,762	32,377

DECEMBER PIG IRON

	Number of stacks	Number in blast last day of month Dec.	Nov.	Total tonnage made— Merchant	Nonmerchant	Totals— Dec.	Nov.
Pennsylvania	161	47	47	69,384	521,961	591,345	537,540
Ohio	79	28	28	93,795	321,603	415,398	354,512
Alabama	43	11	10	59,580	54,716	114,296	108,201
Virginia	19	0	0	.....	.....	.....	.....
New York	26	10	10	61,896	64,970	126,866	91,534
New Jersey	4	1	1	5,026	.....	5,026	4,525
Illinois	26	9	7	38,279	102,057	140,336	112,876
Colorado	6	1	0				
Indiana	16	9	9	27,203	150,156	177,359	150,320
Maryland	6	1	1				
Wisconsin	6	1	1				
Kentucky	7	1	1				
West Virginia	5	2	2	.....	33,965	33,965	30,801
Tennessee	14	1	1				
Washington	1	0	0				
Georgia	2	0	0				
Texas	1	0	0				
Minnesota	3	0	0	11,847	13,144	24,991	20,059
Michigan	3	2	2				
Missouri	1	0	0				
Spiegel and ferro—all states	..	0	0	1,264	3,765	5,029	4,590
Totals	429	124	120	368,274	1,266,337	1,634,611	1,414,958

Business Outlook in Ore Trade 100 Per Cent Better

BY A. J. HAIN

"Mined Out!" The Alpena, Virginia, Minn., One of the Big Mines of the Mesabi Range To Have Yielded Up All Its Treasure

HAVING in the past year weathered the worst gale in the history of their business, operators of iron mines in the Lake Superior district naturally look forward in 1922 to a period of recovery and replenishment. That they are justified in doing so is apparent, for they have just "plumbed the depths," so to speak, with a drop of 62 per cent in the shipment of their product. From 60,411,272 tons in 1920 down to 22,725,726 tons in 1921 is the sharpest descent yet recorded in the ore industry. The latter tonnage is the smallest to have been shipped from the district since 1904. It is 28,600,000 tons less than the average yearly shipment for ten years preceding.

The iron ore mining business in 1921 was unprofitable, but the operators anticipate a great improvement, knowing that 60,000,000 tons annual shipment is more nearly representative of the normal scope of their business than any figure below it.

Following such a reverse, it appears to the operators as a foregone conclusion that better times are assured in the new year. How much better, it is difficult to predict; but if the volume of shipments is to be considered as an indication, then a fair estimate would be 100 per cent better. For it seems probable at this time that the blast furnaces of the country will require at least 45,000,000 tons of ore from the Lake Superior district in 1922.

An estimate of 46,533,074 tons made by some ore producers as the amount of ore to be forwarded from the Lake Superior district in 1922 is founded on the assumption that between Jan. 1 and May 31, 1922 the furnace operations will be at the rate of 50 per cent of their capacity; between June 1 and Dec. 31, 1922, at the rate of 65 per cent; and between Jan. 1 and May 31, 1923, at the rate of 80 per cent. The details of this example, showing how the estimate is obtained, are given in an accompanying table.

The phrase "doubling the volume of trade," does not hold in this instance the significance it would have in normal times; for even with last year's ore trade doubled, it still would be 25 per cent subnormal.

Large Stockpiles On Hand

Mine operations this winter will not be so extensive as last winter. A year ago the mining companies went along at the usual rate until March, 1921. From that time on until the close of shipping, the average activity was about 35 per cent.

Unusually large stockpiles were accumulated; those in Minnesota comprise about 12,000,000 tons, and in Michigan, 7,000,000. While companies are beginning to resume work at underground mines, the general average still is extremely low, due to the seasonal stoppage at the open pits. Many underground mines were shut down during the summer so that they could be restarted when outdoor work was suspended.

The policy of the Oliver Iron Mining Co., the largest individual employer of mine labor in the Lake Superior district, was the same as that of the leading independents. In the slack period the company apportioned its activities as much as possible with a view to providing work for its men in winter. This company shipped 13,844,626 tons in 1921 for use in the blast furnaces of the United States Steel Corp., as compared with 24,936,073 tons in 1920. The Oliver company's average shipment for the ten preceding years was 23,761,348 tons.

A large tonnage of ore is being carried in stock in the Lake Superior district that under ordinary circumstances would have been forwarded

Shipments by Ports and Railroads

	Gross Tons 1920	1921
C. & N. W., Escanaba	4,967,605	1,111,661
C. M. & St. P., Escanaba	2,393,465	694,995
D. S. S. & A., Marquette	704,017	198,742
L. S. & I. Marquette	2,711,091	588,204
C. & N. W., Ashland	6,858,327	2,008,111
Soo Line, Ashland	1,322,525	256,594
G. N., Superior	12,685,230	4,507,160
Soo Line, Superior	1,475,693	325,790
N. P., Superior	651,475	158,328
D. M. & N., Duluth	15,479,334	9,164,803
D. & I. R., Two Harbors	9,278,464	3,286,338
Totals	58,527,226	22,300,726

Approximate Shipments by Ranges

	Gross Tons 1921	1920
*Mesabi	16,090,388	37,149,277
*Vermillion	867,913	1,007,435
*Cuyuna	484,118	2,191,528
Total Minnesota	17,442,419	40,348,240
*Gogebic	2,264,705	8,763,332
*Marquette	1,014,805	4,608,323
*Menominee	1,578,797	6,562,106
Mayville, etc.	51,000	129,571
Misc. shipments by rail	374,000	
Grand total	22,725,726	60,411,572

* Includes lake shipments only in 1921.
† Absorbed in range figures for 1920.

How 1922 Ore Shipping Estimate Is Determined

OPERATORS of iron ore mines in the Lake Superior district figure on a total shipment in 1922 of approximately 46,533,074 tons. This is based on an estimate of furnace operations throughout 1922 and in the first five months of 1923. In making this estimate, it is assumed that between Jan. 1 and May 31, 1922 the furnace operations will be at the rate of 50 per cent of their maximum monthly production, 3,400,000 tons of pig iron, the rate attained in October, 1918. That between June 1 and Dec. 31, 1922, the rate will be 65 per cent of "capacity" and in the first five months of 1923 it will be 80 per cent.

These factors present the elements of uncertainty in estimating the ore shipment in 1922. The amount of ore on hand at furnaces and lower lake docks is known; given the furnace rate from Jan. 1, 1922 to June 1, 1923, the operators would know in advance what more was required of them. The season's shipment, of course, supplies ore for the first five months of the following year and also provides for a surplus to insure continuous operation of the furnaces. The normal surplus remaining at furnace yards and lower lake docks May 1 is 20,000,000 tons.

This is purely a theoretical method the ore operators have for determining the volume of their business, collectively, in advance, but it affords the nearest approach that can be made toward the actual. The following table shows in detail the method used to arrive at the estimate:

		Tons
Ore on Lake Erie docks, May 1, 1921		8,093,854
Ore on furnace yards, May 1, 1921		19,501,623
Total		27,595,477
Total 1921 ore movement by lake, including 52,145 tons from Canada		22,352,871
All-rail ore movement, 1921, estimated		425,000
		50,373,348
Less tonnages forwarded to Canadian furnaces		490,000
		49,883,348

Pig Iron Production Estimates:

	Actual Figures	Stacks operating last day of month
May, 1921	1,215,272	90
June, 1921	1,064,007	74
July, 1921	864,642	69
August, 1921	954,901	69
September, 1921	975,912	84
	5,074,734	

Estimates taking 3,400,000 as maximum pig production—

Oct., 1921	1,233,232	45% of capacity
Nov., 1921	1,414,958	
Dec., 1921	1,700,000	
	9,422,924	
Jan. 1 to May 31, 1922, 5 months	8,500,000	50% of capacity 1,700,000 per month
June to Dec. 31, 1922, 7 months	15,470,000	65% of capacity 2,210,000 per month
Jan. 1 to June 1, 1923, 5 months	13,600,000	80% of capacity 2,720,000 per month
	46,992,924	
Less 11.5% from other than Lake Superior districts	5,686,750	
	41,306,174 @ 1.85 = 76,416,422 amount of ore will be required to operate furnaces on foregoing basis.	
Add normal surplus for May 1, 1923	20,000,000	96,416,422
		46,533,074

to furnaces in 1921. A certain portion of this was mined last winter to be ready to ship on contract. Instead of receiving instructions to ship the full amounts, the operators were asked to hold back. They did so, and adjusted their differences with furnaces as best they could. Much of the ore was mined at high cost, while in stockpile it is subject to more taxation than if it were in the ground. Hence, some of the operators are inclined to go slow in the future in accumulating stock.

The operators petitioned the Minnesota tax commission for a reduction in the taxes on stockpiled ore, having in mind the purpose of enlarging the extent of this winter's work for the benefit of the miners. The commission practically rejected their plea, allowing but a small fraction of what they asked. This was a discouraging influence.

Some Surplus on Hand

The independent operators have more ore on hand at present than normally would be the case in the spring after the winter operations. The stress and emergency of the situation, according to the operators, did not fully appeal to the commission, else winter mining could have been accelerated, and hundreds of men put to work.

Taxes and Wages

A special interim commission of the Minnesota legislature appointed to study the tax situation was told that the present personal property tax laws penalize the progressive operator for giving employment to the populations of mining towns during the winter months. They pointed out that on the assessment day, May 1, the farmers' bins are bare and the merchants' stocks are generally reduced to a low point, but the underground miner must have a whole winter's accumulation of ore on hand, due to the elements that limit his shipping period. It was suggested that the assessment of underground stockpiles should be based on the average tonnage in stock spread over the 12 months of the year.

While exact figures are not available, the new occupational, or so-called tonnage tax, failed miserably of its purpose in the first year of its operation as a result of the low state of the mining business.

Even with the general effort being made to operate as many of the underground mines as possible, there is considerable unemployment. Labor could be obtained at lower rates than are being paid. The attitude of the majority of the operators seems to be to pay as high wages as possible.

Indications at present point to the conclusion that there will not be much of an increase over present operations until spring. Then a great improvement may be expected. Meanwhile some of the miners on the Menominee range, where all the mines are underground, and where conditions have been difficult all summer, are given work at 21 cents an hour, the rate which was in effect in 1914. In Minnesota, the rate paid by the Oliver Iron Mining Co. as recent as November was 32½ cents, and in Michigan this company paid 30 cents. The company also was making concessions in the rental of its houses. The company has carried 10,000 men on its payroll since May 1, 1921, many of whom were employed only part time. It shipped some ore from 37 mines. Twenty-three were operated the full season.

The wage schedule for surface labor at open pit mines generally prevailing in November was $3 per day of 10 hours. Reports were heard of small operations in Minnesota paying common labor $2.80 and one independent company was reported to be still paying $3.25. This compares with the high wage of $5.33 which prevailed in

1920, and with the wage of $2 to $2.20 paid in 1914 for the same labor and same hours.

With these wage adjustments accomplished, and more to be made, coupled with a demand that does not tax equipment to capacity and the prospect of lower railroad rates from mines to docks, an opinion may be formed as to the direction in which prices may move this year. That they must be reduced if the Lake Superior district is to compete in the eastern furnace centers against the foreign ores that are pushing for entrance, is a foregone conclusion. The lowering of the rates from lower ports to furnaces was not sufficient to overcome the advantage of foreign ores in the eastern district. The upper lake rates are the key to the situation. The case filed by the shippers in 1920 against the railroads has been strung along, it has been remarked, "like that of Jarndyce vs Jarndyce "while the mining industry has been given jaundice."

From the viewpoint of the iron and steel industry as a whole, the subject of greatest interest and importance relating to the Lake Superior district is what is being done to bring into commercial use the immense supply of "lean" iron ore. Not as immediate in its nature as the matter of next year's prices, it is true, but none the less significant, as affecting the manufacture of pig iron at a date within measureable distance, especially for those furnaces which have no connections with iron ore mining properties.

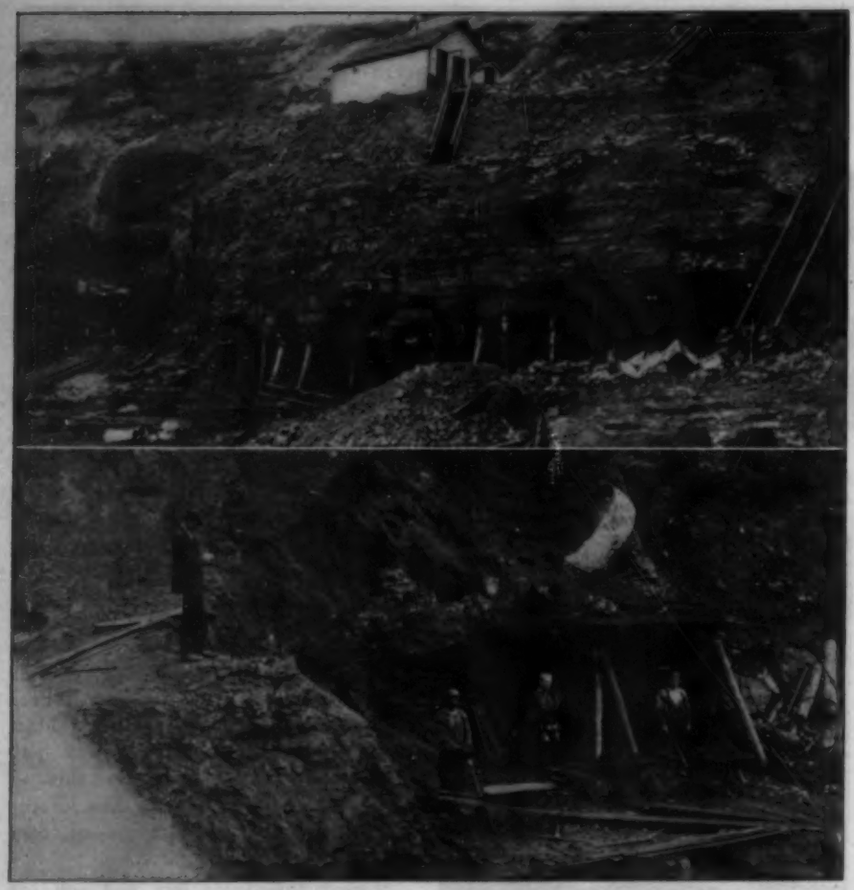
THE MAGNETIC ORE CONCENTRATING PLANT OF THE MESABI IRON CO. IS RAPIDLY NEARING COMPLETION

THE 48 X 72-INCH PRIMARY CRUSHER AT BABBITT ALREADY HAS BEEN PUT TO THE TEST IN REDUCING ROCK PREPARATORY FOR FINE GRINDING, MAGNETIC SEPARATION AND SINTERING. BELOW IS A GENERAL VIEW OF THE NEW PLANT

Discoveries of high grade ore are not keeping up with the volume of shipments. The finding of new bodies today is a great event, whereas a few years ago it was a common occurrence. Presently the relationship between supply and demand will be emphasized more forcefully. This means that unless the low grade ores are developed extensively, the blast furnaces will be compelled to pay more. No man appreciates this as keenly as does the mining man, or the furnace operator who owns or controls a supply.

Mining companies buy and sell ore properties; the large furnace companies acquire mines or an interest in them; they maneuver for position of advantage in the possession of the desirable product. For years this has been a game of checkers on the board of the "forties"; the abundance of the rich ores making the use of lower grades of secondary consideration, or no consideration; "something for future generations to deal with." Now the few big ore companies are congratulating themselves on their position—a position of influence and far-reaching importance in the future of iron and steel, that is to be increasingly emphasized, particularly if the proposed merger of independent steel companies is concluded.

The beginning of work on the concentrating plant at Babbitt on the Mesabi range marked the introduction of a



SCRAMMING WORK AT THE PALMER-HARTLEY MINE, MESABI RANGE, SHOWING HOW THE ORE IS TAKEN FROM POCKETS AND CHANNELS IN THE BOTTOM AND EXTENDING OUT FROM OPEN PIT. THE LEASE ON THE PALMER MINE, RECENTLY WAS GIVEN UP BY THE OPERATING COMPANY, THE OLIVER IRON MINING CO.

new era in mining. This still is in an experimental stage, and deals only with ores susceptible of direct magnetic separation, but the possibility of making quickly and practically available great reserves of the low grade ores of other descriptions is arousing widespread interest. This is increased by the prospects of new combinations of iron and steel interests which will require positive and unlimited sources of supply.

A glance at the Minnesota state tax reports of 1912 shows that at the close of that year 1,401,340,743 tons of ore was listed as reserves in the ground. On May 1, 1921 the tax commission reported the reserves to be 1,300,705,295 tons. This is 100,635,448 tons less than in 1912. From 1912 to 1921, inclusive, the shipments from the Minnesota ranges totalled 320,541,833 tons. The state's tax officials are especially vigilant in regard to merchantable ore; if any ore is overlooked or not placed on the tax duplicate it is the low grade material, undeveloped and unfit for use.

The officials have the assistance of able mining engineers of the University of Minnesota, and others; the driving force of politicians determined on getting for the state all they can out of the mine owners, and the published statements of expert investigators; these factors give significance to the tax reports, where otherwise they might be of questionable worth.

The tax commission reported that the iron ore in the ground in Minnesota May 1, 1920 was 1,330,384,163 tons. The figure reported this year shows a drop of 29,678,868 tons. The shipment from the Minnesota ranges in the period amounted to 40,348,240 tons. New ore developed amounted to about 9,500,000 tons. While the combined shipments in 1921 were at an extremely low ebb, the new ore found probably will not equal it. Little development work was done either in Minnesota or Michigan.

In the Jan. 6, 1921 issue of THE IRON TRADE REVIEW, the matter of reserves was gone into extensively in explaining the basis for the plant at Babbitt for converting the iron ore in the rock of the East Mesabi range into a shipping product. Practically 90 per cent of this plant has been completed, and shipments will be made in 1922. The plant will operate only with magnetic ore, but if this is a success steps may be taken by some of those interested in the development of the Lake Superior ore reserves to establish on a commercial basis a practical method for concentrating the lean hematite ores.

Meanwhile, experimental work is being done at the University of Minnesota toward preparing hematite for magnetic separation. As well known, the method consists simply of roasting the ore with a small percentage of fuel to convert it to magnetite. The ensuing process as contemplated at present would be similar to that used at Babbitt with the addition of the magnetic roasting furnace.

During the year practically all of the well-known mining men of the Lake

Minnesota Ore Reserves and Assessed Values

Ore in Ground

County	Tons	Assessed value	Tons	Assessed value
	May 1, 1920		May 1, 1921	
St. Louis	1,155,321,044	$260,204,446	1,133,142,819	$255,095,622
Itasca	150,707,549	18,903,305	142,758,175	17,979,573
Crow Wing	24,275,570	2,159,145	24,753,323	3,255,423
Lake	80,000	5,000	50,978	44,410
Totals	1,330,384,163	$281,271,896	1,300,705,295	$276,375,028

Ore in Stock Piles

	May 1, 1920		May 1, 1921	
St. Louis	10,153,826	$11,460,251	9,936,975	$7,386,550
Itasca	589,990	1,066,022	438,169	469,794
Crow Wing	544,389	653,985	327,267	249,585
Lake	2,170	2,270	3,073	4,468
Totals	11,290,375	$13,182,528	10,705,484	$8,110,397

Total Merchantable Ore in Ground and Stock Piles

	May 1, 1920		May 1, 1921	
St. Louis	1,165,474,870	$271,664,697	1,143,079,794	$262,482,172
Itasca	151,297,539	19,969,327	143,196,344	18,449,367
Crow Wing	24,819,959	2,813,130	25,080,590	3,505,008
Lake	82,170	7,270	54,051	48,878
Totals	1,341,674,538	$294,454,424	1,311,410,779	$284,485,425

The assessments as given in this table do not include the assessments for surface values, structures or improvements.

Superior district have journeyed to Babbitt to view the new plant. Engineers and furnace operators from other districts have inspected it. All buildings have been erected except the coal-handling plant. A considerable part of the mechanism has been installed. The heavy primary crusher is set in a pit cut out of solid granite. It was operated for the first time on Oct. 10, 1921 when about 10,000 tons of rock was put through. A description of the layout of the Babbitt plant was given in the Jan. 6, 1921 issue of THE IRON TRADE REVIEW. Its practical operation will not start before spring of 1922.

In the past year there has been no material departure in mechanical equipment in the mining of ore. The electric driven shovel seems to be gaining in favor. The use of a small type of shovel on caterpillars has raised the question as to the advisability of this means of propulsion for larger shovels. A large saving might be expected, due to the elimination of labor and track laying.

New records were made in loading and unloading iron ore during 1921. The steamer D. G. KERR, of the Pittsburgh Steamship Co. was loaded with 12,507 gross tons of ore at the Duluth & Iron Range railroad docks, Two Harbors, in 16½ minutes on Sept. 7. The same vessel established a new record for unloading with this cargo when delivered at Conneaut, O., Sept. 12. The cargo was discharged in three hours and five minutes.

The transportation of iron ore on the Mississippi river is to be attempted on a greater scale in 1922. Four towboats and 19 barges will be placed in service between St. Paul and St. Louis, carrying ore south and coal and oil north. The barges have a capacity of 2500 tons each. The fleet originally was projected as an adjunct in the war enterprise. All the boats have been leased to and will be operated by the Mississippi Valley Iron Co. which operates a blast furnace at St. Louis.

REVOLVING CATERPILLAR SHOVELS NOW ARE USED IN STRIPPING AND CLEANING OPERATIONS IN THE LAKE SUPERIOR DISTRICT. EXPERIMENTS ARE BEING CARRIED ON TO EQUIP THE HEAVIER TYPE OF MINING SHOVELS WITH CATERPILLARS

A steel and concrete ore dock estimated to cost $3,000,000 is to be built by the Great Northern railroad to take the place of the wood dock, No. 2 of the Allouez Bay group. The dock will be 2100 feet long and will have 350 pockets, the same as the present dock. It will be completed in 1923 and will be the ninth steel and concrete ore dock in the upper lakes; in addition to two reinforced concrete docks.

Glancing over the high-spots of mining affairs in 1921 it is noted that the Oliver Iron Mining Co. surrendered the state leases on the Shiras and Chester mines, Mesabi range, and is preparing to strip the Little & Prindle mine at Nashwauk, Minn. About 2,000,000 cubic yards of overburden will be removed, and shipments will be made in 1923. The company also is stripping the Minnewas mine in the Virginia district, leased from the state. The Minnewas has been operated on a small scale as an underground mine; as an open pit it is expected to be the big producer in the Virginia district. The company also is preparing to mine ore at Hibbing; the town now having been moved to its new location.

In the past two years fully 20 companies which were attempting to exploit ore properties on the Cuyuna range have gone out of business. The majority of them were small companies seeking to raise funds by the sale of stock, and their failure cannot be attributed entirely to the lack of possibilities. One-half the properties on the range are reported to have been turned back to the fee owners within the past year.

Notwithstanding this situation, the use of Cuyuna range manganiferous ores in blast furnace practice is in-

Ore Shipments by Ports and Months

1920

Month	Escanaba	Marquette	Ashland	Superior	Duluth	Two Harbors
April	.....	.....	9,149	111,848	27,431	27,783
May	72,048	13,985	208,390	730,708	1,199,457	369,439
June	138,756	38,959	309,398	873,674	1,681,411	558,791
July	238,258	80,470	434,088	875,005	1,731,094	688,772
August	309,111	129,691	468,283	917,693	1,833,247	671,133
September	556,158	196,697	418,620	668,570	1,503,237	569,840
October	405,554	259,491	335,180	655,915	1,188,926	388,015
November	86,771	67,653	81,597	157,865	.....	12,565
December	.....	.....	.....	.....	.....	.....

1921

Month	Escanaba	Marquette	Ashland	Superior	Duluth	Two Harbors
April	.....	.....	.....	205,586	25,268	.....
May	795,673	375,036	1,013,049	1,983,660	1,662,971	1,145,696
June	1,147,136	553,367	1,299,820	2,256,250	2,528,446	1,448,547
July	1,174,468	610,321	1,293,239	2,249,431	2,783,537	1,527,610
August	1,277,561	602,567	1,327,294	2,266,497	2,351,918	1,444,926
September	1,088,806	493,311	1,253,633	2,330,512	2,304,726	1,452,494
October	1,030,683	482,495	1,260,162	2,274,801	2,432,465	1,368,380
November	791,130	298,011	726,985	1,245,661	1,390,003	853,948
December	55,613	.....	6,670	.....	.....	36,863

AN UNUSUAL VIEW ON THE RANGES. THE SCRANTON MINE, MESABI RANGE, HAVING BEEN WORKED OUT AS AN UNDERGROUND MINE, THE PROPERTY IS BEING STRIPPED, EXPOSING, AS SHOWN IN THE PHOTOGRAPH, THE SHAFT FORMERLY USED FOR THE UNDERGROUND

creasing. This is true at both steelworks furnaces as well as at merchant furnaces making foundry and other grades of iron.

A development that may be of considerable importance to the Cuyuna range is the publishing of a rate of $3.25 on iron ore from the district to St. Louis, this rate being slightly less than the total combined rail, lake and dockage rate from the head of the lakes to Pittsburgh at the time it was published, and only a little more than that combined rate as revised in October. The Maroco mine, operated by the Marquette Ore Co., shipped its product by rail to St. Louis because of this rate.

Aside from the development of the Maroco into a shipper of washed concentrates, the interesting development on the Cuyuna has been the discovery of a new deposit of high grade ore at the Kennedy mine of the Steel & Tube Co., the present indications of which point to one of the large ore bodies of the range.

John A. Savage & Co. continued to strip the Sagamore mine, one of the big mines on the Cuyuna. A machine shop 50 x 60 feet of fireproof construction, has just been completed. Concrete foundations are now being installed for the new ore screening, crushing and drying plant which will be in operation in 1922.

Shipments of the high-grade ore from the Vermillion range in 1921 came nearer to conforming with normal standards than those from any range in the Lake Superior district. The total was 867,913 or 83 per cent of the total, 1,007,435 tons, in 1920. The Chippewa Iron Mining Co. which controls and operates the Armstrong Bay mine, formerly the La Rue, blocked out 45,000 tons of what is said to be the first hard ore to be discovered on the range in more than 30 years. Railroad construction work has been going on during the past three months to connect the mine with the main line of the Duluth & Iron Range railroad. This will be completed early in the spring so that the company will enter the shipping lists at the opening of navigation in 1922.

The feature of general interest on the Michigan ranges is the great extension of electric power equipment. One of the notable additions was the starting of the motor-driven hoist at the Corrigan shaft of the McKinney Steel Co. on the Gogebic range. This hoist has a capacity of 210 tons an hour from a vertical depth of 3000 feet.

The Oliver Iron Mining Co. has completed the addition to the central power plant at the "G" Pabst mine at Ironwood, and an electric substation for the transmission of power to the Puritan and Davis mines. Pickands, Mather & Co. resumed stripping of the Plymouth mine on the Gogebic range Nov. 1. M. A. Hanna & Co. assumed the operation of the Ashland and Germania mines at Ironwood. Oglebay, Norton & Co. sank a new shaft at the Montreal mine.

The electrification of mine equipment, undertaken a number of years ago by the Cleveland Cliffs Iron Co. on the Marquette range, as already described, has shown operators on the Menominee the possibilities of economy in this direction. The Cleveland, Cliffs company uses hydro-electric power generated by its own system, but power is being purchased by the mines on the Menominee from private companies. Pickands, Mather & Co. have arranged to receive electric power for their Warner and Porter mines on the latter range.

THE NEW TOWN OF HIBBING, A TYPICAL VIEW OF WHICH IS SHOWN IN THE UPPER ILLUSTRATION IS ONE OF THE FINEST IN THE LAKE SUPERIOR DISTRICT, APPEARANCE AND STRUCTURES CONSIDERED. THE OLD TOWN, BELOW, IS DESERTED. THE BUILDINGS ARE BEING RAZED UNDER THE 40 ACRES THROUGH WHICH THIS MAIN STREET PASSES, IS 15,000,000 TONS OF HIGH-GRADE ORE, STATE TAX COMMISSION ESTIMATE

Wage Changes

In Basic Industries Analyzed By National Industrial Conference Board

The National Industrial Conference board, in a report about to be issued shows wage changes in 23 basic industries for the period July, 1914, to June, 1921. The report covers data from 4398 establishments employing at the peak in 1920 approximately 1,250,000 workers. Separate statistical information is given for these industries, and in addition composite results are presented.

The investigation finds that composite average hourly earnings of all wage earners, increased 156 per cent between July, 1914, and September, 1920. The decline from the latter period to the middle of 1921 amounted to 16.5 per cent. At that time the net increase over July, 1914, was 114 per cent.

By September, 1920, the hourly earnings of common labor had increased 163 per cent over July, 1914. In the same month those of skilled labor showed an increase of 149 per cent, while the high point of hourly earnings for women was reached in June, 1920, when there was an increase of 171 per cent over the 1914 level.

Composite weekly earnings of all wage earners increased 140 per cent between July, 1914, and July, 1920. The peak was reached in July, 1920, when weekly earnings averaged $29.81. The decline from July, 1920, through to June, 1921, amounted to 23.3 per cent. The net increase from July, 1914, to June, 1921, was 85 per cent.

The report presents composite data for all industries and a comparison between classified groups in all industries as well as a comparison of composite hourly and weekly earnings with the cost of living.

The investigation shows that the reduction in weekly earnings has been far more extensive than in hourly earnings, due chiefly to part time operation and employment and to plant shutdowns.

Open Tunnel Bids Feb. 7

Bids for the construction of the vehicular tunnel under the Hudson river to connect New York and New Jersey will be opened Feb. 7. Ground will be broken early in March and the time limit for the completion of the work is Dec. 13, 1924. It is expected the cost of the completed tunnel will be in the neighborhood of $28,669,000. Bids for construction are to be submitted to the chief engineer, C. M. Holland, Room 614, Hall of Records, 31 Chambers street, New York. Approximately 115,000 tons of tunnel segment castings will be required. In connection with the segments, approximately 4000 tons of 1¼-inch bolts, including washers and nuts will be required. Large quantities of structural and reinforcing steel and also considerable cast iron, wrought iron and steel pipe will be required.

Wages Cut, Work Starts

A reduction of 15 per cent in wages, proposed by employes, was put in effect Jan. 3 at the Upson Nut works of the Bourne-Fuller Co., Cleveland, and the number of employes was increased from 800 to 1600. It is planned by the company to resume operations until April 1, with the hope that by that time conditions will have improved to justify a continuation.

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Japan Buying

Tin Plate Again in Welsh Market—Scrap Negotiations Continue

Staff Cable

London, Jan. 2.—The Japanese have renewed the heavy buying of Welsh tin plate. Recent orders aggregate 50,000 boxes, at about 18 shilling 6 pence ($3.88), per box, f.o.b. Semifinished material again is firmer, but many finished lines and pig iron are lower. Middlesbrough blast furnace workers have accepted a reduction bringing their wages to 36 per cent above the prewar level. Negotiations for the shipment of scrap to the United States are continuing.

Lorraine is complaining of the failure of Germany's coke deliveries, receiving 9000 tons daily, instead of 15,000.

Belgian semifinished material is quoted at £6 15s ($28.51) per metric ton; German semifinished, £6 5s ($26.31) and German beams, £7 15s ($32.62), Antwerp.

Resigns as National Tube Co. Sales Head

Edward Worcester, vice president in charge of sales of the National Tube Co., Pittsburgh, has resigned, effective Jan. 1. Mr. Worcester has been identified actively with the tubular steel trade for more than 30 years. He retires from active business, but will still hold an inactive connection with the National Tube Co. He will devote his time to private interests and further study of subjects in which he is vitally interested and to which he has given much thought for some years. Mr. Worcester was born in East Bridgewater, Mass., Jan. 29, 1855 and his first business connection was with the Chapman Valve Co., Boston. He entered the employ of that company in 1870, 52 years ago, and in 1875 became a salesman. He left that position in 1875 to become head salesman in the Chicago agency of the National Tube Works Co. From 1877 to 1882 he was salesman for the Walforth Mfg. Co., Boston, and from 1882 until 1886 was assistant secretary, and later secretary of the Crane Bros. Mfg. Co., Chicago. In 1888 he was appointed local manager of the St. Louis office of the National Tube Works Co., combined with this being the position of secretary of the Western Tube Co., Kewanee, Ill., in which the National Tube Works Co., in 1890 acquired an interest. In 1897, Mr. Worcester was appointed assistant sales manager of the National company at McKeesport, Pa. This company was later taken over by the United States Steel Corp. and its name was changed to the National Tube Co. In 1903, Mr. Worcester was appointed vice president of the National Tube Co.

John H. Nicholson, who has been with the National Tube Co. for 22 years, for several years as vice president in charge of operations of the seamless tube plants, succeeds Mr. Worcester. Mr. Nicholson was one of the owners of the Standard Seamless Tube Works, Ellwood City, Pa., which was acquired by the National Tube Co. in 1900, when he became affiliated with the National company. Taylor A. Allderdice, vice president in charge of operations at all except the seamless tube works, now takes charge of operations at all plants.

Inland Steel Co. Names G. H. Jones' Successor

Edward M. Adams, vice president of the Inland Steel Co., Chicago, has been given the additional duties of general manager of sales for the company, succeeding G. H. Jones, whose retirement recently was announced. Mr. Adams, who has been a vice president since 1919, previously had been secretary since 1905 when he became identified with the company. He was born in 1876 at Cherry Valley, Ill., worked for the Illinois Central railroad and in 1900 joined the Buda Co. as traffic manager.

Other changes in the Inland personnel include the recent appointment of Walter C. Carroll as vice president in charge of sales in the sheet division and Charles R. Robinson as vice president in charge of sales of the rail and track accessories division.

Mr. Jones, who retired to devote his time to the Hillside Fluor Spar mines, of which he is president and treasurer, now has offices located at 1212 First National Bank building, Chicago.

Elected as Partners

Elton Hoyt II, son of the late James H. Hoyt and for 11 years in the iron ore department of Pickands, Mather & Co., Cleveland, has been made a partner in the organization, effective Jan. 1. On that date also, George M. Humphrey, for several years in the legal department of M. A. Hanna & Co., Cleveland, became a partner in the Hanna company.

Prices Present and Past

Representative market figures yesterday, one month ago, three months ago and one year ago

	Jan. 4, 1922	Dec. 1921	Oct. 1921	Jan. 1921
PIG IRON				
Bessemer, valley, del., Pittsburgh	$21.71	$21.96	$22.06	$33.96
Basic, valley, del., Pittsburgh	20.46	20.61	21.16	31.29
No. 2 foundry, del. Pitts	21.96	22.26	22.96	32.86
No. 2 foundry, Chicago	19.00	20.00	21.50	32.75
Lake Superior charcoal, Chicago	31.50	31.50	32.50	40.25
Malleable, valley	20.00	20.00	20.25	32.00
Malleable, Chicago	19.00	20.00	21.50	32.75
*Southern No. 2, Birmingham	16.50	17.15	19.00	33.00
*Southern Ohio, No. 2 Ironton	20.00	20.00	21.00	34.60
Basic eastern del., eastern Pa.	20.25	20.80	20.50	33.35
**No. 2X, Virginia furnace	22.75	22.50	23.25	34.50
**No. 2X, eastern del. Phil.	21.75	22.00	22.00	35.00
Gray forge val. del. Pittsburgh	21.46	21.56	21.96	31.96
Ferromanganese, del., Pittsburgh	60.00	60.00	61.65	101.00
SEMIFINISHED MATERIAL—				
Sheet bars, bessemer, Pittsburgh	30.00	30.00	31.50	47.00
Sheet bars, open-hearth, Pitts	30.00	30.00	31.50	47.00
Billets, bessemer, Pittsburgh	29.00	29.00	30.00	43.50
Billets, open-hearth, Pittsburgh	29.00	29.00	30.00	43.50
FINISHED MATERIAL—				
Steel bars, Pittsburgh	1.50	1.50	1.60	2.35
Steel bars, Chicago	1.60	1.60	1.75	2.73
Steel bars, Philadelphia	1.85	1.85	1.95	2.70

	Jan. 4, 1922	Dec. 1921	Oct. 1921	Jan. 1921
FINISHED MATERIAL Continued				
Iron bars, Philadelphia	$1.85	$1.85	$1.95	$3.20
Iron bars, Chicago mill	1.65	1.65	1.75	2.75
Beams, Pittsburgh	1.50	1.50	1.60	2.45
Beams, Philadelphia	1.85	1.85	1.95	2.80
Beams, Chicago	1.65	1.65	1.75	2.83
Tank plates, Pittsburgh	1.50	1.50	1.60	2.65
Tank plates, Chicago	1.60	1.60	1.75	3.03
Tank plates, Philadelphia	1.85	1.85	1.95	3.00
Sheets, blk., No. 28, Pittsburgh	3.00	2.95	3.00	4.35
Sheets, blue anl., No. 10, Pitts	2.25	2.25	2.50	3.55
Sheets, galv., No. 28, Pittsburgh	4.00	3.95	4.00	5.70
Wire nails, Pittsburgh	2.50	2.75	2.90	3.25
COKE—				
Connellsville furnace, ovens	2.75	2.80	3.25	5.15
Connellsville foundry, ovens	4.00	4.00	4.50	6.50
OLD MATERIAL—				
Heavy melting steel, Pittsburgh	14.50	14.25	14.00	15.00
Heavy melting steel, eastern Pa.	11.75	11.90	*12.25	15.00
Heavy melting steel, Chicago	11.00	11.35	12.35	15.25
No. 1 wrought, eastern Pa.	15.50	15.75	15.85	20.50
No. 1 wrought, Chicago	11.50	12.10	14.65	15.65
Rerolling rails, Chicago	12.50	12.90	14.00	15.80

*1.75 to 2.25 silicon **2.25 to 2.75 silicon

Ore to Steel—An American Industrial "Melting Pot"

Annual Market Reviews For 1921

Pig Iron	Ferroalloys
Coke	Structural Shapes
Semifinished Steel	Rails
Tin Plate	Sheets
Cast Iron Pipe	Warehouse Trade
Merchant Bars	Nonferrous Metals
Welded Pipe	Old Material
Wire Products	Coal By-Products
Plates	Refractories

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Industry Emerging From Slump

1921 Is Year of Extreme Depression in Production and Consumption—Lowest Relative Point in History Is Touched—Liquidation Holds Sway—Moderate Recovery Develops in Closing Months—Prospects for 1922 Are Improved

BY C. J. STARK
Editor, The Iron Trade Review

LIQUIDATION stamped its mark heavily upon the iron and steel industry in 1921. It dictated buying and selling policies and consequently controlled the curves of prices and production. It forced continuing readjustment in a steadily downward scale until, capacity of output and of consumption considered, the industry was driven to the lowest point in its history before an equilibrium was reached in July. The year stands out even among past periods of great depression as one of the severest in trials and hardships for producers ever known. Peculiarly it was a time of reaction coming as the sequel to the feverish conditions of 1920. It strongly accented how unstable and artificial that market had been.

Uncertainty was the dominant note of the iron and steel situation at the beginning of 1921. A year of severe retrenchments and readjustments still has left the outlook far from clarified. Yet a close examination of the economic movements of the past 12 months and a full appreciation of their far-reaching character, compels the confidence that the recuperative process which in time will restore normal business volume and rewards of enterprise, now definitely is under way. There is cause for satisfaction if not for optimism in the fact that steel production rose from its most depressed level of less than 20 per cent of capacity in July to 50 to 55 per cent in October and November and did this on the basis of miscellaneous needs representing bare maintenance and replacement consumption and a minimum of new undertakings. With stocks in makers', distributors' and consumers' hands depleted, the indications at the year's close were favorable that these largely wear-and-tear requirements would sustain the volume of the market and would provide a foundation upon which a broadening demand gradually could be built up.

Poor Output Shown

It is necessary to go back many years to find a parallel for the low stage of production which was reached by 1921. The output of pig iron, including charcoal was approximately 16,670,000 tons. This is the smallest in 13 years or since 1908 when 15,936,018 tons was produced. In 1920 production was 36,925,987 tons, and the average for 10 years was 31,566,355 tons. The steelworks the past year yielded approximately 20,500,000 tons of ingots which likewise was the lowest since 1908 when the total was 13,677,027 tons. The 1920 figure was 40,881,392 tons and the average for 10 years was 33,781,713 tons. Movement of iron ore from the Lake Superior ranges in 1921 amounted to only 22,300,000 tons which was the lightest in 17 years.

Rates Out of Line

As the liquidation process throughout the industry was extended, the wholly disproportionate margin of cost assumed by the freight factor under prevailing rates was thrown into bolder relief. A typical study has shown that whereas on Jan. 1, 1913, the assembling cost for a ton of basic pig iron in the Mahoning valley was approximately 27 per cent of the selling price, it is now approximately 58 per cent. The estimated assembling charges in the two periods are $4.80 and $10.55 and the prices $16.45 and $18.25 respectively. With labor costs cut down 40 to 50 per cent from the peak, operating efficiency largely restored and other economics forced, the factor of freight cost obviously occupies a commanding position in its bearing upon future prices.

While a substantial reduction of freight rates in itself is not likely to effectively stimulate the market, that it will prove a highly constructive factor, is certain. A fixed conviction exists in the minds of both buyers and sellers that present freight rates are penalizing and choking industry and that economic justice demands and will obtain their ultimate revision. The psychological influence of a material lowering of rates, therefore promises to be great. The railroads under their pinched financial resources have not yet been willing to accept the view that their own best interests in the end call for rate revision. This has proved highly disappointing to the iron and steel industry.

Mergers Are Forced

No development of the year has reflected so plainly the extreme conditions of competition and of management that have been forced upon producers than the crystallizing of various plans for the consolidation of iron and steel companies. Paramount among these enterprises is the proposal now being matured to unite a number of the leading independent steelworks of the country into one operating entity which in capacity would represent probably 50 per cent of that of the Steel corporation. This combination which still is in the stage of preliminary negotiation is designed to effect economies of production and distribution which in the

case of some of the companies at least, have become imperative if present business conditions are to be prolonged. Apart from the proposal of a large independent steel corporation, other efforts toward the combination of various smaller companies have been advanced. Most of these are yet to be successfully carried out. A considerable factor in stimulating efforts toward more thoroughly integrated operations and a wider scheme of distribution among iron and steel plants has been the localizing influence of high freight rates in determining the market field.

Prices Far Down

That finished steel prices at the end of 1921 were extraordinarily low is readily apparent by comparison with equivalent conditions in prewar years. Taking into account the increased factor of freight cost amounting to at least $7 per ton of finished product and of labor which would add probably $3 to $4 per ton more, over the prewar scale, it is apparent that 1.50c on plates, shapes and bars is equivalent to less than 1.00c steel in 1913. How far depressed this level is can be seen in the fact that the 10-year averages of THE IRON TRADE REVIEW, 1904-1913, in these products show 1.40c in bars, 1.50c in shapes and 1.55c in plates.

The course of prices in 1921 is clearly traced by the composite weekly market average of THE IRON TRADE REVIEW embracing fourteen iron and steel products. The average for December, 1920, was $54.04. For December, 1921, it was $34.08, a net decline of $19.96 or 37 per cent. Every month showed a steady decline with the exception of October though obviously the variations were slight toward the end of the year when costs had been pared to the extreme. Basic iron in the Mahoning and Shenango valleys in the year fell from $30 to $18.25; northern No. 2, foundry, Birmingham, from $38 to $17; billets from $47 to $29, Pittsburgh; steel bars, net tons, from $47, Pittsburgh, to $30; structural shapes, net tons, from $49, Pittsburgh, to $30; plates, net tons, from $53, Pittsburgh, to $30; and No. 28 black sheets, net tons, from $87 per net ton, Pittsburgh, to $60.

Market Is Reversed

When the 1921 market began, the spread of steel prices which had existed the preceding year between the schedules of the independent mills and that of the Steel corporation, rapidly was melting away. It then prevailed in only a few rolled products. This was due to the fact that shrinkage of new business, beginning in the fall of 1920 was continuing steadily with the result that the independent producers who had relied largely upon current bookings to sustain their higher levels were obliged to drop their quotations. This process of reducing prices to conform to the droop of new business early in January had brought all independent mills down to the Steel corporation basis. Within a few weeks later the continuing slump of orders together with cancellations and the withholding of shipments by consumers had forced a break below that level. The market then witnessed a complete reversal of the relative positions of the independent companies and the Steel corporation of a few months previously. The latter having accumulated a large volume of unfilled orders at its previously lower prices was not pressed for fresh tonnage and therefore was able to maintain is quotations. It had entered upon 1921 with unfilled bookings of 8,148,122 tons. Its operations were about 90 per cent.

Strive For Orders

By February independent mills were quoting from $5 to $10 per ton under the Steel corporation. As an example, the latter was standing firmly at 2.35c Pittsburgh, for steel bars, 2.45c for structural shapes and 2.65c for plates, while the independent basis then was 2.00c, 2.25c and 2.25c respectively. On Feb. 4 the Midvale Steel & Ordnance Co. had formally announced its policy of dropping below the industrial board level by $7 to $10 per ton.

As the struggle for the limited volume of business offered became intensified, the weakness of the market was more pronounced. Plates, shapes and bars among the independent mills fell to 2.00c Pittsburgh. Such competition began to cut more and more deeply into the business and operations of the Steel corporation. On June 30, its unfilled orders were down to 5,117,868 tons, a net loss in the five months of approximately 3,030,000 tons, or about 40 per cent. After prolonged hesitation the leading interest finally on April 13, announced a general reduction of $1.50 to $3 per ton on semifinished and $5 to $15 on finished products.

Competition Is Met

The policy of meeting competition was continued by the Steel corporation throughout the year. At no time in the twelve months did the producer take the initiative in naming lower prices and it confined its efforts toward protecting its own market. Likewise when business had shown some expansion in September and October, it did not adopt the higher prices in several lines sought to be established by the independents until it was satisfied these were universal and bona fide. As it was, few of these advances could be maintained. At the end of the year, the market was drifting at the low price line of the year, the sole exception being in sheets. Plates, shapes, bars and wire products, after brief periods of higher quotations, all had fallen back.

Exports of iron and steel in 1921 were the smallest since 1914 and with that exception the lowest in 10 years. They totaled approximately 2,200,00 tons. Imports also were reduced and totaled about 125,000 tons.

Average Monthly Iron and Steel Prices in 1921

Average Monthly Prices of Leading Materials at Pittsburgh

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Bessemer	$33.96	$30.96	$28.96	$27.46	$26.06	$25.06	$22.96	$21.96	$22.46	$22.06	$21.96	$21.56
Basic	31.46	28.71	26.56	24.81	23.96	23.16	20.81	20.96	21.46	21.16	20.96	20.46
Foundry No. 2	32.86	29.96	27.96	26.81	25.56	24.26	22.06	21.86	22.96	22.96	22.81	22.21
Malleable	32.00	28.75	26.40	25.40	24.10	22.60	20.40	20.00	20.30	20.25	20.00	19.75
Gray Forge	31.96	29.21	26.96	25.81	24.81	23.16	20.56	19.96	21.96	21.96	21.96	21.46
SEMIFINISHED												
Billets, Bessemer	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
Billets, Open Hearth	43.50	41.00	38.50	37.75	37.00	37.00	32.25	30.00	29.80	30.00	29.00	29.00
Sheet Bars, Bessemer	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
Sheet Bars, Open Hearth	47.00	43.00	39.60	38.75	39.00	37.40	34.00	32.00	30.40	31.50	30.00	29.25
Wire Rods	57.00	57.00	52.00	50.00	48.00	47.00	42.25	42.00	40.80	40.00	38.00	38.00
COKE												
Furnace, Spot	5.15	4.85	4.55	3.60	3.25	3.15	2.75	2.85	3.15	3.25	3.15	2.95
Foundry, Spot	6.50	6.30	6.05	5.00	4.85	4.50	4.45	4.00	4.30	4.50	4.30	4.15
ROLLED PRODUCTS												
Structural shapes, base	2.45c	2.30c	2.10c	2.15c	2.20c	2.05c	1.90c	1.75c	1.70c	1.60c	1.60c	1.50c
Plates, base	2.65c	2.35c	2.05c	2.15c	2.20c	2.00c	1.85c	1.75c	1.70c	1.60c	1.60c	1.50c
Steel Bars, base	2.35c	2.15c	2.00c	2.10c	2.10c	2.05c	1.85c	1.75c	1.65c	1.60c	1.55c	1.50c
Bar Iron, base	3.13c	3.13c	2.70c	2.45c	2.45c	2.45c	2.25c	2.10c	2.05c	2.15c	2.15c	2.15c
Cold Finished Steel Bars	3.60c	3.60c	3.10c	3.05c	3.10c	3.00c	2.75c	2.50c	2.40c	2.25c	2.15c	2.00c
Strip, Hot-rolled	3.30c	3.30c	2.85c	2.75c	2.75c	2.70c	2.50c	2.30c	2.15c	2.15c	2.25c	2.00c
Strip, Cold-rolled	6.25c	6.25c	5.65c	5.50c	5.50c	5.00c	4.40c	3.90c	3.75c	3.75c	3.80c	3.75c
Steel Pipe 1 to 3-in., discount	57.50	57.50	57.50	62.50	62.50	62.50	64.50	64.50	68.50	68.50	68.50	71.00
Standard Spikes	3.65c	3.65c	3.30c	3.30c	3.25c	3.25c	3.00c	2.75c	2.45c	2.35c	2.30c	2.25c
Wire Nails, base	3.25c	3.25c	3.05c	3.20c	3.10c	3.00c	2.80c	2.75c	2.85c	2.90c	2.90c	2.75c
Plain Wire, base	3.25c	3.25c	3.00c	3.00c	3.00c	2.75c	2.55c	2.50c	2.55c	2.60c	2.60c	2.25c
Hoops, base	3.05c	3.05c	2.70c	2.75c	2.75c	2.70c	2.45c	2.40c	2.30c	2.25c	2.20c	2.15c
Bands, base	3.05c	3.05c	2.70c	2.75c	2.75c	2.70c	2.35c	2.20c	2.20c	2.25c	2.15c	2.00c
Structural Rivets	4.15c	3.90c	3.70c	3.60c	3.30c	3.00c	2.70c	2.35c	2.30c	2.40c	2.30c	2.30c
No. 28 Black Sheets	4.35c	4.20c	3.90c	3.90c	4.00c	3.90c	3.35c	3.05c	2.80c	2.80c	2.95c	3.00c
No. 10 Blue Annealed Sheets	3.55c	3.35c	3.05c	2.95c	3.10c	3.00c	2.55c	2.40c	2.30c	2.50c	2.40c	2.25c
No. 28 Galvanized Sheets	5.70c	5.50c	5.05c	4.90c	5.00c	4.90c	4.35c	4.05c	3.80c	4.00c	3.95c	4.00c
Tin Plate per base box	$7.00	$7.00	$7.00	$6.60	$6.25	$6.25	$5.65	$5.25	$5.15	$5.00	$4.80	$4.65
OLD MATERIAL												
Heavy Melting Steel	$15.00	$15.00	$15.00	$13.00	$13.60	$13.10	$12.00	$12.60	$13.20	$14.00	$14.25	$14.25
Low Phosphorus	24.50	22.00	21.20	18.25	18.00	17.00	15.25	15.50	16.30	18.00	17.65	17.25
No. 1 Cast	24.50	22.00	21.00	18.25	17.50	16.00	15.00	14.85	16.30	17.50	17.10	16.25

Average Monthly Prices of Leading Materials at Chicago

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
Lake Superior Charcoal	$40.25	$38.50	$38.50	$38.50	$38.50	$38.30	$36.85	$34.30	$33.25	$32.50	$32.25	$31.50
Northern No. 2 Foundry	32.75	28.63	26.00	24.25	22.85	21.10	19.37	19.00	21.75	21.50	21.00	20.00
Southern No. 2 Foundry	40.41	33.81	31.91	29.66	29.66	28.56	20.12	24.86	24.66	24.66	24.66	24.16
Malleable	33.25	29.15	26.50	24.75	23.35	21.30	19.35	19.00	21.75	21.50	21.00	16.25
ROLLED PRODUCTS												
Bar Iron	2.76c	2.66c	2.63c	2.48c	2.45c	2.22c	1.96c	1.75c	1.75c	1.75c	1.70c	1.65c
Steel Bars	2.73c	2.52c	2.38c	2.46c	2.48c	2.44c	2.28c	2.03c	1.82c	1.75c	1.68c	1.60c
Structural Shapes	2.83c	2.72c	2.50c	2.53c	2.58c	2.44c	2.33c	2.14c	1.92c	1.78c	1.68c	1.65c
Plates	3.03c	2.76c	2.40c	2.53c	2.58c	2.58c	2.33c	2.13c	1.82c	1.78c	1.68c	1.60c
Sheets No. 28 Black	4.73c	4.58c	4.38c	4.28c	4.38c	4.28c	3.68c	3.28c	3.18c	3.32c	3.38c	3.38c
OLD MATERIAL												
No. 1 Railroad Wrought	$15.65	$15.90	$13.50	$12.05	$11.85	$10.80	$10.25	$11.75	$13.05	$14.65	$13.70	$12.00
Heavy Melting Steel	15.25	15.25	12.55	11.25	11.50	11.20	10.55	10.70	11.30	12.55	12.40	11.00
Rerolling Rails	15.80	15.90	13.30	12.70	13.25	12.80	12.45	12.70	13.05	14.00	13.90	12.50
Car Wheels	21.50	21.40	16.60	14.45	14.50	13.70	12.75	13.70	14.90	16.15	16.25	15.50
No. 1 Cast	20.35	21.15	18.10	15.25	15.85	14.90	13.75	13.95	14.50	15.25	15.50	14.00

Average Monthly Prices of Leading Materials in the East

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
PIG IRON												
Basic, Eastern Pennsylvania	$33.35	$29.95	$26.20	$25.00	$25.00	$24.70	$22.25	$20.70	$19.50	$20.50	$20.90	$21.00
No. 2X Foundry, Philadelphia	35.00	31.00	27.40	26.25	26.10	26.00	23.50	21.00	21.40	22.00	22.50	22.00
No. 2X Virginia, furnace	34.50	31.25	28.05	27.10	27.00	26.00	24.50	24.00	23.00	23.25	22.80	22.50
Standard Low Phosphorus, Phila	47.72	46.82	46.82	44.17	43.32	43.32	43.32	43.32	43.32	43.32	43.32	43.32
Standard Gray Forge, eastern Pa	33.00	30.75	27.95	25.50	25.75	25.50	22.75	21.30	20.50	21.00	22.00	21.50
ROLLED PRODUCTS												
Tank Plates, base, Philadelphia	3.00c	2.70c	2.40c	2.45c	2.55c	2.35c	2.15c	2.15c	1.95c	1.95c	1.90c	1.85c
Structural Shapes, base, Philadelphia	2.80c	2.65c	2.40c	2.45c	2.55c	2.40c	2.15c	2.15c	2.00c	1.95c	1.90c	1.85c
Steel Bars, base, Philadelphia	2.70c	2.50c	2.35c	2.40c	2.40c	2.35c	2.15c	2.10c	1.95c	1.95c	1.90c	1.85c
Bar Iron, common base, Philadelphia	3.20c	2.70c	2.55c	2.35c	2.35c	2.25c	2.15c	2.05c	1.95c	1.95c	1.90c	1.85c
Sheets, No. 10 Blue Annealed, Phila.	3.90c	3.70c	3.45c	3.35c	3.45c	3.35c	2.85c	2.65c	2.70c	2.85c	2.70c	2.60c
Billets, Open-hearth, Philadelphia	$51.24	$49.24	$44.24	$43.09	$42.74	$42.74	$37.24	$35.74	$34.74	$34.74	$34.74	$34.74
OLD MATERIAL—Delivered Eastern Pennsylvania												
No. 1 Heavy Melting Steel	$15.00	$14.50	$13.40	$11.75	$11.80	$11.85	$11.25	$11.75	$11.75	$12.25	$12.60	$12.00
No. 1 Railroad Wrought	20.50	20.50	18.70	15.60	15.25	15.50	14.75	14.50	14.75	15.85	16.50	15.75
No. 1 Heavy Cast	25.10	23.75	21.00	18.60	18.35	18.00	17.25	17.00	17.30	18.00	18.40	17.50

Pig Iron Makes Dismal Showing

Production Is Forced To Historically Low Point by Severe Slump of Consumption—Prices Fall from $12 to $21.50 Per Ton—Buyers Follow Cautious Policies—Steelworks Furnaces Compete in Open Market

HISTORICALLY the year when monthly production reached its lowest point, 1921's pig iron market undoubtedly will stand out in memory for several other reasons. Included in the list are: The absence of usual contracting to a large extent, accompanied by sustained spot buying; restriction of purchases and specifications to absolute needs; presence of considerable resale iron; and severe competition to merchant furnaces from steelworks interests. Topping all these, however, was the matter of falling prices, some exceedingly low levels having been brought about at times which could only mean the setting aside of production costs in an effort to liquidate stocks of ore or to turn stocks of iron into cash.

July witnessed the low point in pig iron output. Only 864,642 tons were produced, an average daily output of 27,892 tons for 69 furnaces out of the country's total of 435 blast furnaces. This compares with the highest record production that of October, 1916, with 3,508,180 tons representing the output of 328 furnaces out of 419, an average of 113,167 tons daily. Only one other time during the 15 years was the daily average higher and that was during September, 1918, when 364 furnaces out of 438 made 3,413,223 tons, an average of 113,774 tons daily.

The year's curtailed production was the direct reflection of the slack pig iron market. Furnaces went out faster in the early part of the year than they were going in during the closing months although in November, 25 stacks resumed. All but six of these were steelworks furnaces, 12 being Steel corporation units, and so the increase was relatively unimportant from an iron market standpoint.

Disinclination to contract for future supplies was manifested in practically every territory late in 1920 and early in 1921. Various contracts carried over from the preceding year were adjusted, consumers accepting the loss represented by the difference between the contract price and the prevailing market level, and agreeing to take a new equivalent tonnage for shipment during the first half of 1921. While prior to the contract period, desultory interest would be shown, often the papers would not be signed until the period under negotiation was well along. Early in the last quarter sporadic inquiries appeared in several sections for first quarter and first half. While some were closed at the spot market levels, many makers were disinclined to book extended deliveries at the then prevailing prices. In November and December some real activity was noted along contracting lines and several fair sized lots were closed, particularly in the East, at prices attractive to the buyer. Some makers were willing to accept market figures, or even less, in order to accumulate backlogs of business. A Westfield, Mass., consumer, closed on 7500 tons for early 1922 delivery at $19.25 to $19.30, f.o.b. eastern Pennsylvania furnace, which was the lowest point developed in that territory during the year. A few contracts were booked in the Chicago territory, about $1 above December market levels.

The character of demand all year was fairly well defined, depending upon location of melters. The largest consumers undoubtedly were sanitary ware, stove, heater, boiler and radiator manufacturers. This buying of iron for radiator manufacture largely was centered in Buffalo, Pittsburgh, Cleveland, Detroit and Birmingham, while purchases for the manufacture of sanitary ware were features all through the year at Pittsburgh, Cleveland and Birmingham. Stove manufacturers in St. Louis, northern Ohio and Birmingham took fair sized tonnages while some in Boston territory commenced to negotiate in June for last half. Oil well supply people in the Pittsburgh territory suffered a setback early in the year but regained their position as fairly large users in November. Most interesting perhaps of the buying in the east as well as south was a sustained demand from cast iron pipe makers in Philipsburg, N. J., Lynchburg, Va., Harrisburg, Pa., and Birmingham, Ala. Transactions from these sources involved round tonnages at intervals during the year, some of them for basic iron, although gray forge too, was bought and some sizable contracts were placed for basic for early 1922 delivery by the same interests. A decided lack of demand for iron from the foundries serving the automobile industry was particularly notable early in the year although in April and May demands from that source increased greatly. By the end of May, however, this interest had again declined. Buyers of iron for textile and shoe machinery in Boston did not take tonnages commensurate with normal requirements all through the year, although some fair sized lots were closed at times.

Price reductions which went on practically unchecked until August, furnished one of the high lights of the year's market. Early in the year, as in 1920, it was the custom for trade authorities to settle upon figures below which they said they would not quote and under which they said the market could not drop. However, best guesses proved to be wrong and sellers soon saw the futility of endeavoring to peg the market in advance since they had to change their minds so often as to the stopping point for prices. Costs were set aside in many cases and ore reductions, freight rate reductions, etc., all were discounted in an effort to arrive at a figure that would inspire sizable buying, with but indifferent success. That the major declines, however, took place in the first half of the year, is indicated by the following table of valley prices on six typical grades of iron:

Grade	Price January, 1921	Price July 1, 1921	Price December, 1921	Total decline in 12 months
Bessemer	$32.00*	$22.00	$20.00	$12.00
Basic	30.00*	20.50	18.25	11.75
No. 2 foundry	33.00	21.00	20.00	13.00
Malleable	33.00	22.00	19.50	13.50
Gray forge	32.00	20.00	19.50	12.50
Low phosphorus	45.00	37.00	34.00	11.00

*A reduction of $3 per ton from Dec. 31, 1920, levels.

This represents an average reduction in the 12-month period of a trifle over $12.25. On No. 2 foundry the reduction in the year was from $35 to $20; on eastern Pennsylvania No. 2X from $37 to $22 Philadelphia; on Buffalo No. 2X from $35.25 to $20; on Virginia No. 2X from $35.25 to $22.50; on southern Ohio No. 2 from $35 to $20 Ironton; and on southern No. 2 from $38 to $17.50.

Some little effort was made in August and September to arrest price tendencies and increase the market levels on various grades. Foundry iron was successively advanced to $21 after having sunk to $19 to $20. Weakness again developed in November and December, however, and $20.50, valley, again was quoted. Early in August the Inland Steel Co. at Chicago ad-

Prices of Representative Grades of Pig Iron

1913-1921

BASIC, PITTSBURGH

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$31.46	$28.71	$26.56	$24.81	$23.96	$23.16	$20.81	$20.96	$21.56	$21.16	$20.96	$20.71
1920	39.20	43.65	44.40	44.40	44.65	45.15	47.40	49.40	50.45	47.21	39.46	34.96
1919	31.40	31.40	30.35	27.15	27.15	27.15	27.15	27.15	27.15	27.15	30.40	35.40
1918	33.95	33.95	33.95	32.95	32.95	33.20	33.40	33.40	33.40	34.40	34.40	34.40
1917	30.95	30.95	32.85	39.20	42.14	50.20	53.20	52.75	43.95	33.95	33.95	33.95
1916	19.20	18.77	19.20	19.20	18.95	18.95	18.95	18.95	19.08	20.83	25.95	30.95
1915	13.45	13.45	13.45	13.45	13.45	13.54	13.83	14.89	15.65	15.95	16.70	18.55
1914	13.42	14.09	13.96	13.90	13.90	13.90	13.90	13.90	13.90	13.75	13.45	13.45
1913	17.40	17.29	17.03	16.77	16.15	15.46	15.25	15.07	15.09	14.85	14.09	13.65

BESSEMER, PITTSBURGH

	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$33.96	$30.96	$28.96	$27.46	$26.06	$25.06	$22.96	$21.96	$22.46	$22.06	$21.96	$21.96
1920	40.00	41.15	43.40	43.50	43.90	44.25	46.80	49.50	50.45	50.17	42.33	36.96
1919	33.60	33.60	32.55	29.35	29.35	29.35	29.35	29.35	29.35	29.35	32.00	36.65
1918	37.25	37.25	37.25	36.15	36.15	36.40	36.60	36.60	36.60	36.60	36.60	36.60
1917	35.95	35.95	37.45	42.20	44.95	55.20	57.95	55.55	48.27	37.25	37.25	37.25
1916	21.32	21.45	21.55	21.95	21.95	21.95	21.95	21.95	22.20	24.33	30.35	35.95
1915	14.70	14.63	14.55	14.55	14.55	14.58	14.88	15.89	16.80	16.95	17.45	19.70
1914	15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
1913	18.15	18.15	18.15	17.92	17.90	17.26	16.65	16.52	16.65	16.60	16.09	15.90

BASIC EASTERN PENNSYLVANIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$33.35	$29.95	$26.20	$25.00	$25.00	$24.70	$22.25	$20.70	$19.50	$20.50	$20.90	$20.25
1920	39.75	40.50	43.00	43.70	44.00	44.05	44.10	47.45	51.15	50.75	44.55	34.75
1919	33.90	33.90	32.85	29.65	28.80	25.50	26.60	27.00	27.00	27.90	33.00	35.75
1918	33.90	33.90	33.90	32.90	32.90	32.90	32.90	32.90	32.90	36.60	36.90	36.90
1917	30.15	30.50	33.80	38.25	40.80	46.40	50.75	51.00	46.50	33.50	33.50	33.50
1916	19.50	19.50	20.00	20.50	20.00	19.25	19.00	19.25	20.00	21.00	25.50	30.50
1915	13.50	13.75	14.00	13.25	13.50	13.50	13.75	15.25	17.25	17.50	17.75	18.00
1914	14.00	14.25	14.25	14.25	14.00	14.00	14.00	14.00	14.00	14.00	13.50	13.50
1913	18.25	18.00	17.50	16.50	16.50	16.00	15.25	15.00	15.25	15.25	15.00	14.25

STANDARD LOW PHOSPHORUS, PHILADELPHIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$47.72	$46.82	$46.82	$44.17	$43.32	$43.32	$43.32	$43.32	$43.32	$43.32	$43.32	$35.32
1920	51.60	53.55	53.80	53.80	54.80	60.20	57.80	59.60	65.30	65.30	*65.30	*65.30
1919	51.00	51.00	49.90	46.75	45.80	42.25	41.10	40.25	40.25	40.35	43.00	47.50
1918	55.50	55.50	55.50	55.50	55.50	55.50	56.00	56.00	56.00	57.00	57.00	57.00
1917	54.50	57.50	66.70	75.50	77.00	85.00	92.50	92.50	82.00	55.50	55.50	55.50
1916	32.00	32.00	32.00	33.00	34.00	34.00	33.00	33.00	34.00	40.00	46.00	55.00
1915	19.00	19.00	20.00	20.00	20.00	20.50	21.50	23.50	24.50	28.00	30.00	32.00
1914	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
1913	24.50	24.50	24.00	23.50	23.50	23.50	23.50	23.00	23.00	23.00	21.50	21.00

No. 2X FOUNDRY, PHILADELPHIA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$35.00	$31.00	$27.40	$26.25	$26.10	$26.00	$23.50	$21.00	$21.40	$22.00	$22.50	$22.10
1920	43.90	45.00	45.68	46.80	46.90	46.90	48.55	50.95	53.75	52.625	46.75	38.95
1919	36.15	36.15	35.10	31.90	30.10	29.60	29.50	29.60	29.95	32.00	35.85	40.75
1918	34.25	34.25	34.25	34.25	34.25	34.25	34.50	34.50	34.50	38.85	39.15	39.15
1917	30.50	31.75	36.90	41.75	43.35	47.50	54.35	53.40	47.80	34.00	34.00	34.00
1916	19.75	20.00	20.00	20.75	20.50	19.75	19.75	19.75	19.75	20.50	25.25	30.00
1915	14.25	14.25	14.25	14.25	14.00	14.25	14.50	15.25	16.25	16.50	17.50	19.25
1914	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
1913	18.25	18.00	17.75	17.50	17.00	16.25	15.50	15.75	16.00	15.75	15.50	15.00

NO. 2X FOUNDRY, BUFFALO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$33.75	$31.25	$28.25	$26.75	$26.25	$23.85	$21.75	$21.25	$21.05	$20.40	$20.00	$20.00
1920	41.50	44.60	45.15	46.25	46.25	46.25	46.25	48.75	50.25	51.25	46.00	48.25
1919	32.25	32.25	31.45	28.00	28.00	28.00	28.00	28.70	28.75	29.90	34.45	39.50
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	35.25
1917	35.00	35.00	38.15	40.00	42.75	49.15	53.50	54.00	49.05	33.50	33.50	33.50
1916	18.50	18.60	18.85	19.15	19.00	18.75	18.75	18.75	18.90	20.70	26.65	33.65
1915	13.15	13.05	12.55	12.75	12.75	12.75	12.80	13.70	15.15	15.80	16.70	18.00
1914	13.00	13.00	13.75	13.90	13.50	13.05	13.05	13.20	13.25	12.60	12.45	13.10
1913	17.25	17.00	17.00	16.50	15.50	14.75	14.00	14.00	14.25	14.00	14.00	14.00

VIRGINIA NO. 2X FURNACE

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$34.50	$31.25	$28.05	$27.10	$27.00	$26.00	$24.50	$24.00	$23.00	$23.25	$22.80	$22.50
1920	41.25	42.75	43.25	44.25	45.75	46.25	46.75	49.25	50.25	49.75	45.75	42.05
1919	35.25	33.00	31.56	28.45	27.50	26.50	26.50	28.25	29.25	30.35	33.40	38.25
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	37.50	38.00	38.00
1917	26.50	28.25	34.25	38.30	41.00	46.50	52.25	51.90	46.50	33.50	33.50	33.50
1916	17.25	18.00	18.25	18.50	18.50	18.50	18.50	18.50	17.50	18.50	23.75	27.00
1915	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00	13.50	14.00	15.50	17.00
1914	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
1913	16.00	15.50	15.50	15.00	14.50	13.75	13.00	13.00	13.00	13.00	13.00	12.75

SOUTHERN No. 2, BIRMINGHAM

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$33.75	$27.70	$25.10	$25.00	$22.50	$21.70	20.25	$19.00	$19.00	$19.00	$18.25	$17.00
1920	38.20	40.00	40.00	40.00	42.00	42.30	42.30	42.00	42.00	42.00	39.50	38.00
1919	31.00	31.00	30.00	26.75	26.25	25.25	25.00	26.75	26.75	27.45	30.65	35.15
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	35.25	35.25	25.25
1917	23.00	24.50	28.00	35.80	35.75	35.75	46.00	48.00	43.50	33.50	33.50	33.50
1916	14.50	14.65	15.00	15.00	15.00	14.45	14.00	13.60	14.40	15.15	19.60	23.00
1915	9.50	9.50	9.40	9.35	9.75	9.55	9.60	11.00	11.30	11.75	13.15	14.20
1914	10.50	10.50	10.60	10.50	10.50	10.45	10.05	10.00	10.00	10.00	9.90	9.50
1913	13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00

MALLEABLE, CHICAGO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$33.25	$29.00	$26.25	$24.75	$23.50	$21.20	$19.15	$19.40	$21.75	$21.20	$21.00	$20.00
1920	40.50	42.75	43.50	43.50	43.50	43.50	44.90	46.50	46.50	46.50	43.00	37.50
1919	31.50	31.50	30.44	27.25	27.25	27.25	27.25	27.25	27.25	28.00	32.25	38.80
1918	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.50	34.50	34.50	34.50
1917	30.00	31.25	35.80	39.00	43.20	50.50	55.00	55.00	49.50	33.35	33.50	33.50
1916	19.00	19.00	19.00	19.50	19.50	19.50	19.50	19.50	19.15	19.50	25.00	29.25
1915	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.40	14.20	15.10	17.40	18.00
1914	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
1913	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.40

LAKE SUPERIOR CHARCOAL IRON, CHICAGO

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$40.25	$38.50	$38.50	$38.50	$38.50	$38.30	$36.87	$34.30	$33.25	$32.50	$32.25	$31.50
1920	48.75	55.65	57.50	57.50	57.50	57.50	57.50	57.50	58.30	58.50	58.50	53.50
1919	38.70	38.70	38.70	33.25	31.75	31.75	31.75	32.75	32.75	33.15	35.50	41.00
1918	37.50	37.50	37.50	37.50	37.50	37.50	37.70	37.70	37.70	37.70	38.70	38.70
1917	33.75	34.50	37.55	42.25	49.25	51.80	59.50	59.50	59.50	48.50	37.50	37.50
1916	19.25	19.50	19.75	19.75	19.75	19.75	19.75	19.75	19.75	20.35	21.95	31.75
1915	15.75	15.75	15.75	15.75	15.25	15.25	15.75	15.75	15.95	16.25	17.50	19.25
1914	15.50	15.50	15.50	15.50	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
1913	18.25	18.00	18.00	18.00	18.00	16.75	16.75	15.00	15.00	15.75	15.50	15.50

*Nominal.

vanced from $18 to $20, later going to $22, but in October the price slipped back to $21. Efforts to advance steelmaking irons also were made but were even less successful.

No small governing influence was exercised upon prices by the activity of steelworks blast furnaces, which, because of the slack demand for rolled products, became aggressive sellers of pig iron. In February, however, valley steelworks offered basic iron in Cleveland and elsewhere at $26.50 against the regular market quotations of $28 to $30. One of the largest sales of the first quarter was consummated by a Chicago steel company involving 20,000 tons to a radiaor manufacturer. In excess of 10,000 tons of basic iron represents the total purchases by a steel hoop company from valley steelworks interests at from $23 down to $18, valley, over a period of months, the last purchase being made in July just before the buyer blew in its own blast furnace.

Resale tonnages too, played an important part in enabling users to book tonnages at prices lower than regular market levels by from $1 to $5 per ton. This was more manifest early in the year, however, although in the third quarter brokers made numerous offers of tonnages which patently were resale. At times tonnages would be offered by makers on advice from original buyers that the material could not be accepted on contracts.

Special influences likewise were at work at various times throughout the year which had either a direct or indirect bearing upon the market. A molders' strike in Cincinnati halted foundry iron buying for a time. Other difficulties with molders were successfully adjusted in Buffalo, Boston, St. Louis, and elsewhere. Belgian iron was offered at prices less than the American equivalent by about $5 per ton, particularly in the Pacific coast sections. Some innovations in the foundry iron market were introduced in particular by the policy of the Ford Motor Co. in obligating its casting makers to take at least 50 per cent of their iron requirements from the Ford furnace. When foundry iron demand became so limited during the last of the second quarter and the beginning of the third, the warning by producers of the usual differentials for silicon became widespread. Some makers accepted flat prices for iron whether its silicon content was 1.75 to 2.25, 2.75 to 3.25, or 3.25 to 3.75. In the last quarter, however, the extras were partially reinstated. In October, the possibility of a railroad strike slightly increased the demand for pig iron, particularly of the foundry grade. About that same time the possibility of freight rate reductions on the raw materal entering into pig iron manufacture held up considerable purchasing. At the close of the year, however, the freight rate reductions seemed no nearer than the beginning of the second quarter of 1922.

The new year starts with makers and sellers confident that 1922 largely will make up for any lack of profit in 1921. More optimism was displayed during the closing weeks of 1921 regarding the outlook than has been evident all year. General consumption undoubtedly will improve slowly but steadily.

Export Sales Enliven Coke By-Products

RESTRICTED demand, in conjunction with curtailed production, exerted a steadying influence over the light coal oil distillates in 1921. In fact, the benzols were unchanged throughout the year, while toluol and solvent naphtha made only slight changes, which came during the first two months. In sulphate of ammonia and naphthalene, however, this steadiness was not so pronounced. Sulphate displayed a sagging tendency during the 12 months, while ball and flake naphthalene, weakened perceptibly in the last half. Motor fuel also was depressed declining in sympathy with gasoline during the first three quarters. However, after September it not only equaled but exceeded the advance which took place in gasoline.

At the beginning of the year, the light coal oil distillates were being produced at the full normal rate. Due, however, to general business conditions, production at the coke ovens after the first few months declined steadily, reaching its low point for the year in September, when operations were about 33 1/3 per cent normal. A slight improvement followed when operations increased to around 40 per cent, at which rate they now are being maintained. Much the same situation with regard to production was true of all other products.

The light oil distillates were sold in virtually one market during the early part of the year, that being the motor-fuel field. The chemical interests and other industrial manufacturers, requiring these products, bought practically nothing.

Phenol demand was dull, except for flurries in export buying done at decided concessions under the government fixed resale price, which, as last year, prevailed at 12 cents a pound in carload lots.

Lack of substantial buying by the dyestuff manufacturers was prominent in the market on ball and flake naphthalene. These interests closed on some material during the last half, but it was a small quantity in the aggregate, and constituted virtually the only activity during that period. In the first half, the usual spring buying by the drug trade comprised the bulk of current business, which went at around 8½ cents for flakes and 9½ cents for balls.

The sulphate of ammonia market displayed a sagging tendency throughout year. This caused a heavy reduction in the price of fertilizers in order to unload the stocks, and some companies were successful in a measure. This led to lower sulphate prices.

During the early summer there was practically no demand for sulphate but in July, Japan came into the market and started buying at around $2, in double bags at the ports. The export market then advanced until it reached $2.50 to $2.60, at which levels the foreign buyers withdrew. From that time on there was little buying either for foreign or domestic account.

Coal Tar Products Prices in 1921

PRODUCERS' PRICES F.O.B. WORKS

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Benzol	$0.33	$0.33	$0.30	$0.30	$0.30	$0.33	$0.33	$0.33	$0.33	$0.33	$0.33	$0.33
Toluol	0.33	0.33	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Solvent naphtha	0.315	0.315	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
*Phenol	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Naphthalene flakes	0.095	0.095	0.085	0.085	0.085	0.085	0.08	0.08	0.08	0.075	0.07	0.065
Naphthalene balls	0.0105	0.0105	0.095	0.095	0.095	0.095	0.09	0.09	0.09	0.085	0.08	0.075
Spot sul. of am'onia	$3.375	$3.125	$2.925	$2.575	$2.45	$2.45	$2.35	$2.00	$1.95	$2.20	$2.20	$2.20
Fu. sul. of am'onia	n	n	n	n	n	n	n	n	n	n	n	n

N—Nominal.
*—Government fixed prices, f.o.b. government stores.

Coke Price Drop Feature of Year

Reduction from $20 in August, 1920 to $2.75 in December, 1921, for Furnace Fuel, Accompanied by Decrease in Connellsville Output from 10,750,227 to 3,750,000 Tons—Makers Confident Road Is Clear for Steady Improvement in Trade

IN CONSIDERATION of the price peaks reached by beehive fuel in 1920, the low points developed in 1921 furnished one of the most noteworthy features of the past year's coke market. Closely allied with these price declines, or largely contributory, was a lack of demand which in turn caused low production. In these latter respects the coke market closely paralleled the pig iron market.

Barometric of the furnace coke market, blast furnace operation saw its worst point in July since on Aug. 1 only 69 out of the country's 435 blast furnaces were operating. From that point the improvement was more or less steady, the total active on Sept. 1 being the same, 69; 15 being added in September, 11 in October, and 25 in November. This increased blast furnace activity, however, really did not mean much in the aggregate to the Connellsville furnace coke market.

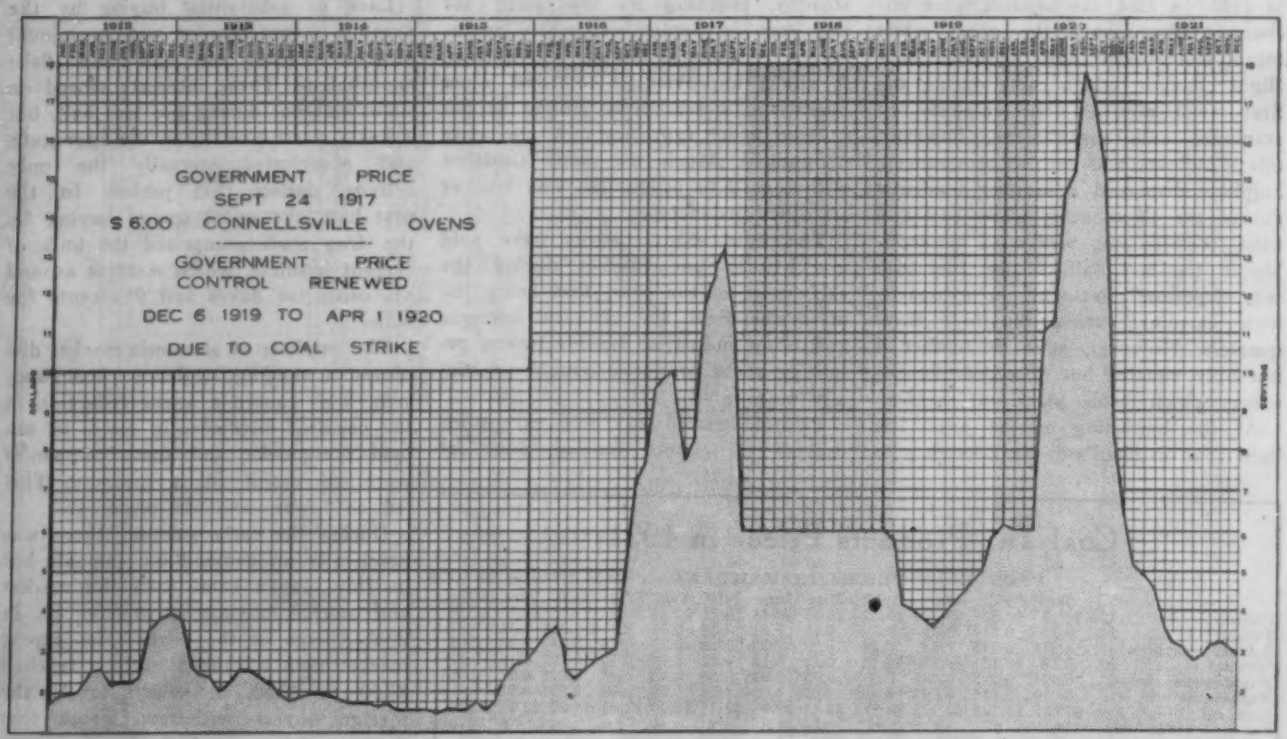
Because most of the furnaces which became active in that period were steelworks furnaces, and since some of the merchant furnaces bought by-product coke at prices in some cases 15 cents per ton or more below the Connellsville equivalent, Connellsville coke production saw no commensurate improvement. However, its production increased almost weekly during the last four or five months of the year.

Production estimates demonstrate that just as July stands out as marking the low point in iron and steel production as well as consumption, so it does in connection with coke. In the week ended July 9, but 18,400 tons of coke was produced in the region as against 162,390 tons the same week in 1920. This compares with the largest weekly production in either 1920 or 1921, namely for the week ended March 26, 1920, with 254,550 tons. While in 1920 the Connellsville region produced a total of 10,750,227 tons, the estimated production for all of 1921 is not more than 3,750,000 tons.

Declines Are Much Smaller

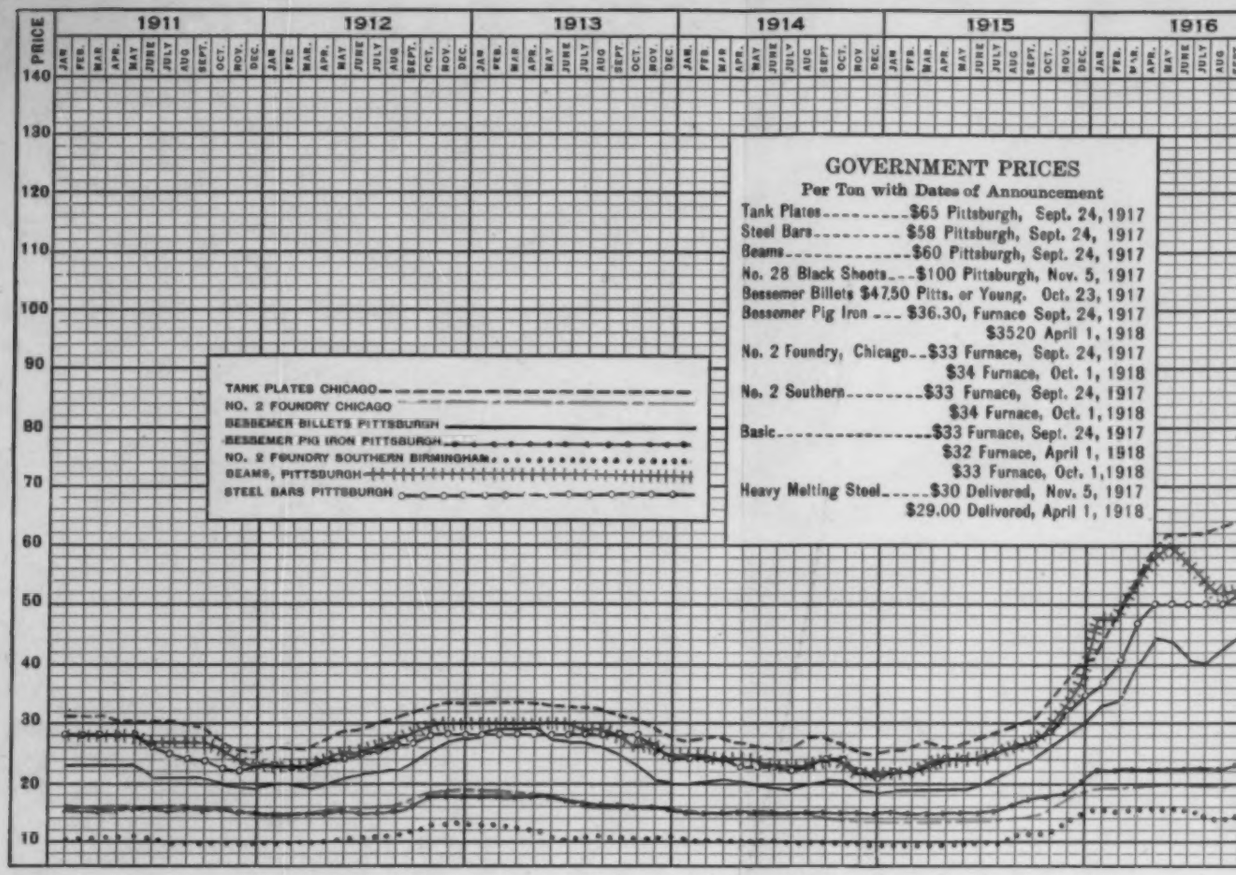
With reference to prices, the spectacular effects which characterized their rise and fall in 1920, were absent in the year. While in August of 1920 the high points had been reached with $20 and $21, respectively, for furnace and foundry coke, low points in 1921 were attained in July and August and again in December when furnace coke was sold at $2.75 and foundry at $3.75, with some minor transactions at 25c under those levels. The preceding year saw reductions of about $5 per ton at a time, but in 1921, which opened with furnace and foundry coke selling at $5.25 and $6.50 Connellsville ovens, respectively, the individual declines were much smaller and the market fell far more gradually.

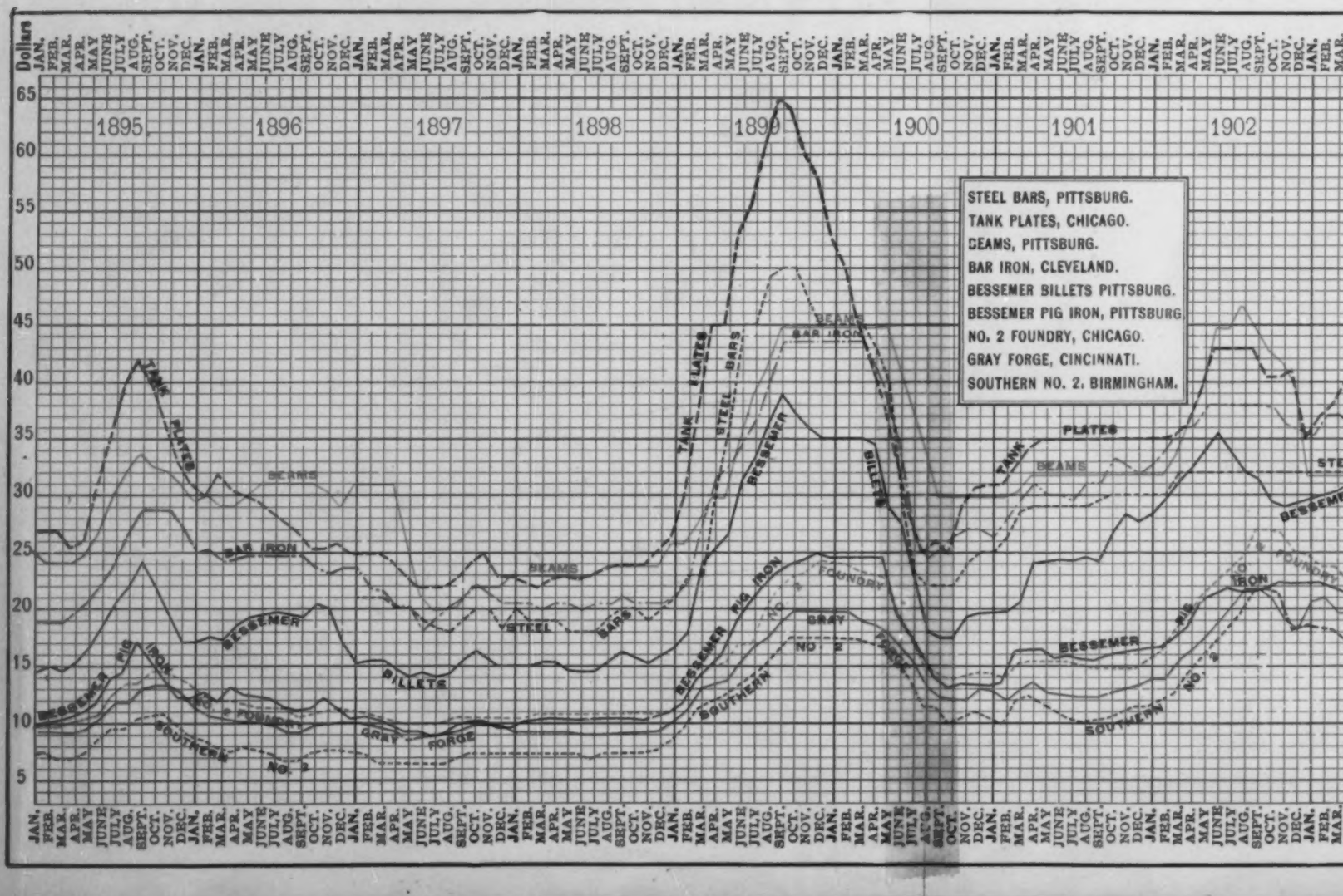
Less harassed in 1921 by transportation difficulties than in the preceding year, some coke producers were not without labor troubles. In February and March, and again in September, efforts were made by certain large independent interests to depart from the H. C. Frick Coke Co. wage scale but the endeavor was unsuccessful due to the general discontent caused among the workmen. The two labor difficulties which became threatening in the last half, namely the railroad and coal disagreements caused scarcely a ripple insofar as increasing the demand for coke. The railroad strike would have meant the stoppage of demand for everything for which coke consumption is required, and hence no effort was made to store coke against such an emergency. Neither was there storing of



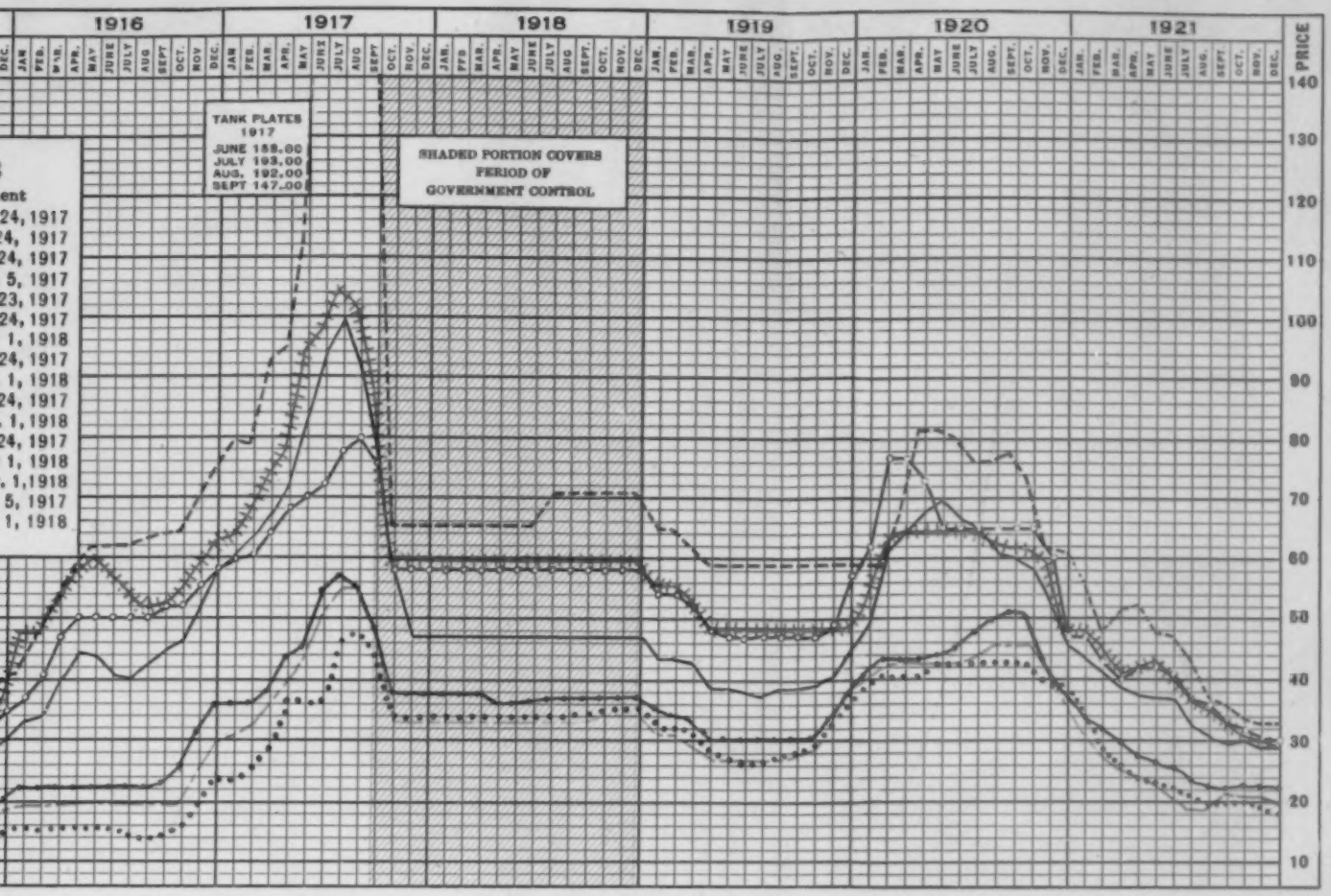
PRICES AT OVENS OF CONNELLSVILLE FURNACE COKE 1912-1921. SHADED PORTION REPRESENTS GOVERNMENT CONTROL

Finished Steel Products Given In Net Tons, Pig Iron and Billets In Gross Tons

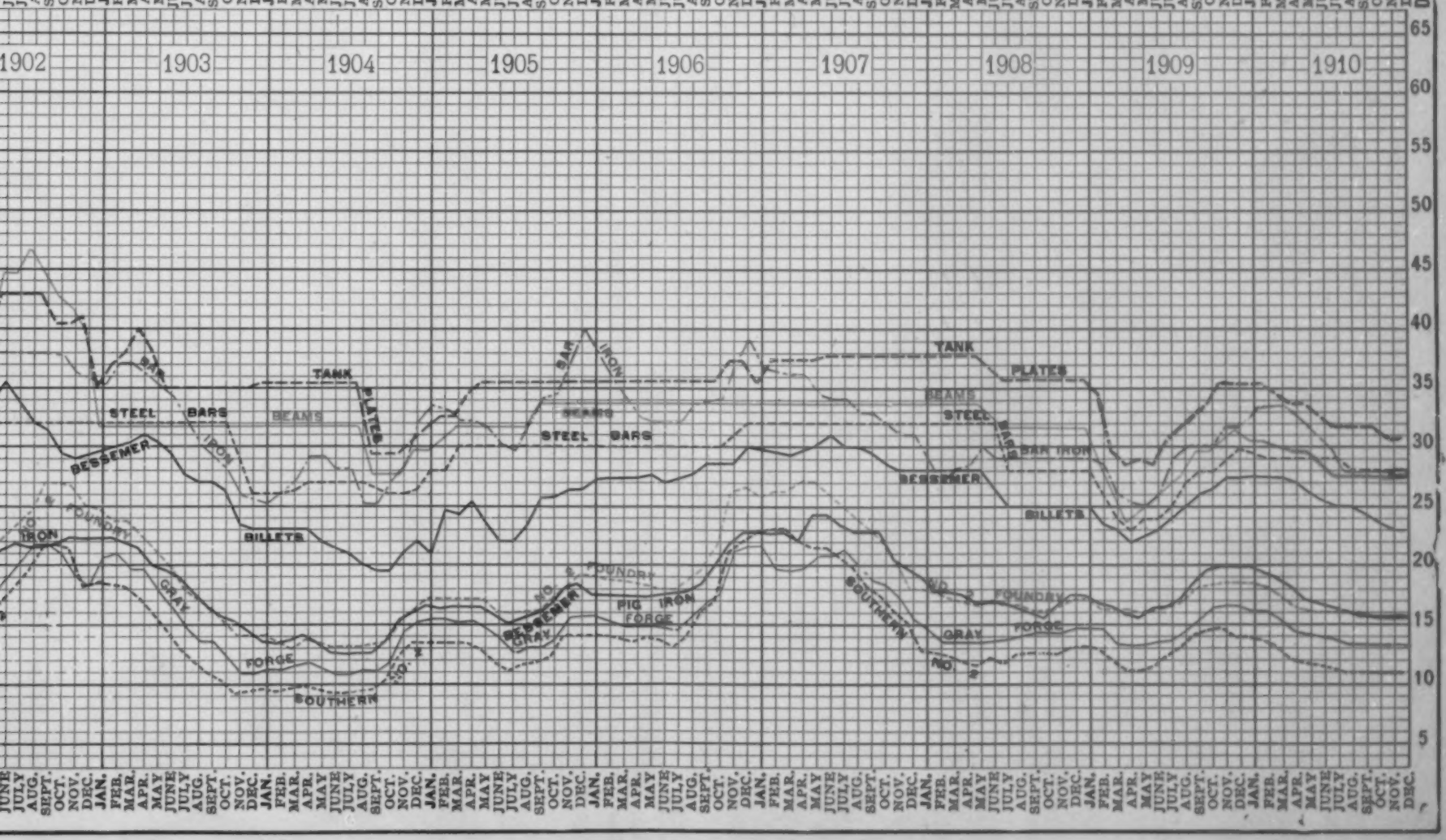

PRICE
1911
1912
1913
1914
1915
1916
TANK PLATES CHICAGO
NO. 2 FOUNDRY CHICAGO
BESSEMER BILLETS PITTSBURGH
BESSEMER PIG IRON PITTSBURGH
NO. 2 FOUNDRY SOUTHERN BIRMINGHAM
BEAMS, PITTSBURGH
STEEL BARS PITTSBURGH
GOVERNMENT PRICES
Per Ton with Dates of Announcement
Tank Plates ---------- $65 Pittsburgh, Sept. 24, 1917
Steel Bars ---------- $58 Pittsburgh, Sept. 24, 1917
Beams ---------- $60 Pittsburgh, Sept. 24, 1917
No. 28 Black Sheets --- $100 Pittsburgh, Nov. 5, 1917
Bessemer Billets $47.50 Pitts. or Young. Oct. 23, 1917
Bessemer Pig Iron --- $36.30, Furnace Sept. 24, 1917
$3520 April 1, 1918
No. 2 Foundry, Chicago --- $33 Furnace, Sept. 24, 1917
$34 Furnace, Oct. 1, 1918
No. 2 Southern ---------- $33 Furnace, Sept. 24, 1917
$34 Furnace, Oct. 1, 1918
Basic ---------- $33 Furnace, Sept. 24, 1917
$32 Furnace, April 1, 1918
$33 Furnace, Oct. 1, 1918
Heavy Melting Steel ---- $30 Delivered, Nov. 5, 1917
$29.00 Delivered, April 1, 1918



TRADE REVIEW



Monthly Fluctuations of Iron and Steel Prices For a Period of Twenty-Seven Years



Connellsville, Virginia and West Virginia Coke

Average Monthly Prices for Year 1921

	Wise County		Pocahontas		New River		Connellsville	
	Furnace	Foundry	Furnace	Foundry	Furnace	Foundry	Furnace	Foundry
January	$9.25	$10.35	$8.50	$10.75	$9.75	$11.75	$5.15	$6.50
February	8.30	8.85	8.50	9.75	7.95	10.35	4.85	6.30
March	7.25	7.50	8.50	9.50	7.50	9.65	4.55	6.05
April	7.15	7.45	8.45	9.40	7.25	9.15	3.60	5.00
May	6.75	7.25	8.25	9.00	7.00	8.75	3.25	4.85
June	6.35	6.95	8.25	9.00	7.00	8.65	3.15	4.50
July	5.55	6.50	8.25	9.00	7.00	8.50	2.75	4.45
August	5.50	6.50	8.25	9.00	7.00	8.45	2.85	4.00
September	5.50	6.50	8.25	9.00	7.00	8.25	3.15	4.30
October	5.00	5.85	6.00	7.00	7.00	7.95	3.25	4.50
November	4.90	5.75	6.00	7.00	7.00	7.75	3.15	4.30
December	4.65	5.65	6.00	7.00	7.00	8.25	2.95	4.15

sizable quantities of coke against a possible coal strike although several buyers ordered in a few extra carloads. One transportation difficulty encountered was in the spotting of unsuitable cars for coke shipment, the percentage running abnormally high at times, particularly after the industry commenced to enjoy the slight improvement noted in August and September.

The slump in demand which got well under way in the last quarter of 1920 caused a curtailment of contracting activity for first quarter and first half. Some contracts placed were subsequently suspended. Others received no attention by buyers, shipping instructions were withheld, and not until prices were adjusted in harmony with the prevailing market levels were releases issued. All year long there was an absence of long-time contracts although there were many month-to-month arrangements as well as contracts for quarterly requirements of stated tonnages. Each coke inquiry issued preparatory to a furnace going into blast was the signal for extensive negotiations and some attractive figures were developed. Notwithstanding that fact, however, even lower figures were at times available on by-product coke, particularly from valley steel works interests, and several instances were noted where the by-product coke was favored, notably by the Sharon Steel Hoop Co. and the Shenango Furnace Co. These particular sales exercised no small measure of influence in bringing about further weakness in connection with Connellsville coke toward the end of November after the market had strengthened considerably in October. The usual price level in September was $3 while in October it had advanced 25 cents per ton dropping to $3.15 and $3.10 the latter part of November. This was followed by further declines back to $3 and then to $2.75 in December, and even 2.50 was reached.

The past year was notoriously a poor year for foundry operations and this was reflected in the constantly curtailed demand for 72-hour coke. In the third quarter perhaps more activity was shown in 72-hour fuel than in furnace coke but relatively small tonnages were involved in individual negotiations. Backlogs of small week-to-week or month-to-month requirements, however accrued and served to furnish operating schedules for some interests which, if dependent upon blast furnace business, would have been entirely inactive. Foundry coke demand dropped off heavily in the last quarter and while most users accepted fuel on contract obligations, the spot demand decreased. A limited amount of contracting for first quarter and first half coke likewise was noted. A few such arrangements were closed as high as $5 per ton. On certain brands of standard selected 72-hour hand-drawn coke as high as $4.50 and $4.75 was obtained in the spot market but early in December $3.75 prevailed for good quality coke and some sales at $3.50 were noted. Some machine drawn 72-hour fuel sold as high as $3.25.

Connellsville Output

From Connellsville Courier

1921	
Dec. 10	
Dec. 3	83,070
Nov. 26	74,620
Nov. 19	68,680
Nov. 12	62,530
Nov. 5	67,400
Oct. 29	65,200
Oct. 22	62,510
Oct. 15	56,640
Oct. 8	53,200
Oct. 1	52,300
Third quarter	412,370
Second quarter	533,170
Indicated total 1921	
1920	
Fourth quarter	2,654,840
Third quarter	2,529,270
Second quarter	2,380,670
First quarter	3,105,919
Indicated total 1920	10,679,699
1919	
Fourth quarter	2,798,242
Third quarter	2,761,723
Second quarter	1,658,811
First quarter	3,039,972
Indicated total, 1919	10,258,748
1918	
Fourth quarter	3,669,194
Third quarter	4,438,405
Second quarter	4,422,782
First quarter	3,485,763
Indicated total, 1918	16,016,144
1917	
Fourth quarter	4,045,518
Third quarter	4,569,066
Second quarter	4,771,852
First quarter	4,471,905
Indicated total, 1917	17,858,341

New England by-product coke demand likewise suffered setbacks both in demand and price. The year's market opened around $16.70 delivered Boston, and in December $10.66 was current. The northern New Jersey by-product coke maker accepted first half business in 1921 at $11.84 delivered Newark, while the prevailing price in the last month of the year was $8.84, or $4.50 Connellsville base. Demand from regular sources for by-product coke in New England became so erratic that makers aggressively sought business, set aside their fixed levels and openly met Connellsville competition during the latter part of February. In June New England by-product makers discontinued naming the Connellsville base with reference to last half contracts. These were made at prices to be fixed monthly in harmony with prevailing market prices. In St. Louis, Connellsville foundry coke was quoted early in the year at $7 to $7.75 ovens, with the furnace grade $1 less. Late in the year prices were $4 and $3, respectively. Other districts witnessed similar declines.

Toward the close of 1921 all districts reported small interest in future requirements. Many users were expecting lower freight rates and to prevent a loss on piled coke would not order anything beyond needs in sight. Desultory buying for first quarter and first half was entered into by buyers in various districts. Most of these were consummated at prices satisfactory to the buyer, but accepted by the seller in order to accumulate a backlog with the hope that more business would follow, which, averaged with the low-priced sales, would net a slight profit. Nothing, however, was heard of the 5 to 1 sliding scale contracts based on the price of basic pig iron, which practice was so prevalent late in 1920 and early in 1921. The year closed with basic pig iron selling below $19 valley, which on the 5 to 1 sliding scale basis would give a $3.80 price for furnace coke, or considerably higher than the furnace coke prices of the last half of 1921.

Semifinished Demand in Sight

Stocks Have Been Liquidated Fairly Well and Sizable Tonnage Business Is in Prospect—Events of the Past Year Were Discouraging and Were Marked by Price Declines and Small Demand

PRICE declines in semifinished steel products gained so much momentum the latter part of 1920 that they were carried into 1921 and continued steadily throughout the year. In this they obeyed the law of demand, the lack of which probably was more pronounced in semifinished lines than in finished steel. All through 1921 there was a noticeable absence of sales of semifinished products because the volume of finished steel demand was limited. During the 12 months just ended there was but one real attempt to arrest the falling market in semifinished. This occurred in connection with sheet bars in September and October. After a price below $30 had appeared, valley makers and other producers started to quote $32 when sheets were advanced $5 per ton. This price however, did not remain firm, its chief effect having been to drive in tonnage at $30 and under. A nominal quotation of $32 was maintained for some time and then the usual competitive conditions again reigned. Toward the latter part of the year $28.50 again appeared in connection with one or two fair sized lots of sheet bars. A comparative list of prices at the beginning of 1921 and at its close follows:

	January, 1921	December, 1921	Total decline per ton using minimum figures
Sheet bars.....	$47.00	$28.50 to $30.00	$18.50
Rerolling billets, 4 x 4-inch ...	43.50	28.00 to 30.00	15.50
Rerolling billets, smaller	47.00	30.00 to 31.00	17.00
Forging billets.	51.00	32.00 to 35.00	19.00
Slabs	46.00	29.00 to 30.00	17.00
Wire rods	57.00	38.00 to 40.00	19.00
Skelp:			
Grooved..	2.45c to 3.00c	1.50c to 1.70c	19.00
Universal.	2.55c to 3.00c	1.50c to 1.70c	21.00
Sheared..	2.65c to 3.00c	1.50c to 1.70c	23.00

This represents an average decline of $18.75 per ton for each of the seven kinds of material listed, compared with an average decline in 1920 of about $27.50. As the law of supply and demand worked to send prices skyward the preceding year, so the lack of demand which commenced in the fall of 1920 continued to work all through 1921, bringing gradual revisions downward. The chief declines were made on April 13 by the United States Steel Corp. when it began to quote sheet bars and small billets at $39; 4 x 4-inch billets and heavier at $37; slabs at $38, and wire rods at $48. The next official reduction came on July 5 when the Bethlehem Steel Co. quoted $35 on sheet bars and small billets; $33 on 4 x 4-inch and heavier billets; $34 on slabs, and $42 on wire rods. These prices were met by the Steel corporation, under the policy of losing no customers on price, which it continued to follow the remainder of the year.

Undoubtedly sheet bars were the most active of the semifinished lines during the year. For long periods, however, none would be sold and the only movement registered would be in

Average Monthly Prices of Semifinished Steel 1913-1921

Per gross ton, Pittsburgh

BESSEMER BILLETS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	$43.50	$41.00	$38.50	$37.75	$37.00	$37.00	$32.25	$30.00	$29.80	$30.00	$29.00	$29.00
1920	49.60	61.25	65.00	68.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	33.75	34.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.40	23.00	24.60	25.50	27.75	29.60
1914	20.00	21.00	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.00	28.90	29.00	29.00	27.70	26.50	26.50	26.10	25.00	23.00	20.85	20.00

OPEN-HEARTH BILLETS

1921	$43.50	$41.00	$38.50	$37.75	$37.00	$37.00	$32.25	$30.00	$29.80	$30.00	$29.00	$29.00
1920	49.60	61.25	66.25	70.00	70.00	66.25	65.00	61.25	60.00	58.75	52.50	46.25
1919	43.50	43.50	42.25	38.50	38.50	38.00	37.30	38.00	38.50	39.30	40.85	45.00
1918	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50	47.50
1917	60.00	62.50	67.00	72.50	85.00	93.75	100.00	93.00	73.75	58.75	47.50	47.50
1916	34.75	35.00	40.60	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	19.50	19.50	19.50	19.50	19.50	19.85	21.50	24.00	25.60	26.50	28.00	30.20
1914	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
1913	28.70	29.40	29.50	29.50	28.10	26.50	26.50	26.10	25.00	23.00	20.85	20.00

BESSEMER SHEET BARS

1921	$47.00	$43.00	$39.60	$38.75	$39.00	$37.40	$34.00	$32.00	$30.40	$31.50	$30.00	$29.25
1920	53.40	65.00	70.00	70.00	75.00	70.00	70.00	70.00	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	43.20	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.00	72.50	88.00	101.25	105.00	96.00	82.50	65.50	51.00	51.00
1916	33.75	34.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	20.00	20.00	20.00	19.60	19.50	20.35	21.70	24.00	24.60	25.50	28.25	30.80
1914	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	28.70	29.40	29.50	29.50	28.40	27.50	27.50	27.10	25.60	23.80	21.75	21.00

OPEN-HEARTH SHEET BARS

1921	$47.00	$43.00	$39.60	$38.75	$39.00	$37.40	$34.00	$32.00	$30.40	$31.50	$30.00	$29.25
1920	53.40	65.00	72.50	78.00	78.75	75.00	75.00	71.25	68.50	63.75	56.25	47.65
1919	47.00	47.00	45.75	42.00	42.00	41.50	40.80	42.00	42.00	43.20	45.00	48.00
1918	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00	51.00
1917	60.00	62.50	67.00	72.50	88.00	101.25	105.00	96.00	82.50	65.50	51.00	51.00
1916	34.75	35.00	41.00	45.00	44.25	41.20	40.00	43.60	45.00	45.75	52.00	58.75
1915	20.00	20.00	20.00	19.60	20.00	20.35	22.00	25.00	25.80	26.50	28.50	30.80
1914	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.60	19.00
1913	29.20	29.90	30.00	30.00	28.80	27.50	27.50	27.10	25.60	23.80	21.75	21.00

connection with specifications by regular customers of the Carnegie Steel Co. or the larger independents. At one time early in the year the leading interest had difficulty in supplying all the requirements of its constituent company, the American Sheet & Tin Plate Co. This condition was superseded, however, by a quiet period which reached its climax in June and July, and during that period specifications dropped to a minimum and new orders were practically nil. The last of the third quarter, however, witnessed some improvement.

Rerolling billets apparently were less sought in 1921 than any of the semi-finished group. Piecemeal buying prevailed all year and at times some sellers would go weeks and even months without receiving an inquiry. Buyers could not afford billets, at prevailing prices, notwithstanding the comparatively low figures offered, and convert them at the market figures applying upon their own products. At times most makers endeavored to maintain a $5 differential over 4 x 4-inch rerolling billets for billets of forging quality, but so little forging billet business was offered that competition became keen and the established differential often was set aside. In the last quarter, $32 became available on forging billets while the lowest heard on 4 x 4-inch billets was $29.

Most plate and skelp mills which had to buy their slabs for conversion preferred to remain out of the market rather than buy at available market figures. Some inquiries issued during the 12 months came out in Youngstown in September calling for 8000 and 12,000 tons, respectively, on which $30, Youngstown, was named.

While larger mills had regular customers on wire rods, it was difficult for them to get regular weekly specifications. In September some sizable tonnages were shipped to Japan and on such, $38, Pittsburgh, was made, as against the prevailing price of $41.

Some round tonnages were purchased at $38 in November and December while smaller lots were sold at $40. The American Steel & Wire Co. had a nominal quotation of $41 at the year's end.

Early in the year some producers maintained a slight differential in price between the three grades of skelp, namely grooved, universal and sheared. The Carnegie Steel Co. was quoting in the forepart of January 2.45c, 2.55c, and 2.65c, base Pittsburgh, respectively against a flat price of 3.00c by some independents. While at times, $2 or $3 per ton above the plate base was quoted, skelp quotations closely followed the plate market trend and in December 1.50c, base Pittsburgh, was quoted.

Encouragement is felt among steel manufacturers generally over the prospects for 1922. Stocks in hands of consumers have been fairly well liquidated and many consuming lines give promise of early buying.

Stock Liquidation Retards Tin Plate

SPORADIC operations, stock liquidation, curtailed demand and price declines were some of the salient features of the 1921 tin plate market. Because operations were so erratic, it is difficult to obtain an accurate estimate of tin plate production for last year, but when the final figures are compiled the aggregate will not exceed by much over 20,000,000 base boxes, or scarcely over half of the maximum output in recent years.

Late in June many tin mills became inactive awaiting the signing of the new wage scale with the Amalgamated Association of Iron, Steel and Tin Workers. Output was increased in the last quarter. Among the companies which began to operate on a 100 per cent basis in November, were the McKeesport Tin Plate Co. and the Standard Tin Plate Co., with 44 and 24 tin mills, respectively. After the American Sheet & Tin Plate Co. on Nov. 3 gave its price to jobbers for first quarter and to manufacturers for the first half of 1922, specifications commenced to come out and to permit increased rolling schedules during December. On Dec. 5 the leading interest had 83½ per cent of its tin mills scheduled, every hot mill in the two New Castle plants being operated, and the Crescent works at Cleveland, which had been idle practically all year, was placed on the active list. This with later additions brought the company's tin plate operations to above 85 per cent of capacity.

Stock liquidation was an important item in the tin plate market the past year. Approximately 1,500,000 base boxes of stock plate were on hand at the beginning of the year and makers in order to move the quantity of tin plate adopted a "stock plate" price which ranged from 50 to 75 cents per base box under the production plate price. By November, however, these stock piles had dwindled to a relatively small amount. Solving the stock-on-hand problem is considered the most important development of the year in view of the expected larger demand for production plate in 1922. In some directions the outlook suggests possibility of a shortage.

Prices have moved downward step by step, there being four, so-called official, price reductions. These declines were in harmony with decreases on other steel products but coming less often, they were proportionately higher. When other steel products were reduced April 13 from $1.50 to $5 a ton, tin plate declined $15 per ton to $6.25 per base box from the industrial board level of March 21, 1919, which it had been maintaining all of the preceding year until that date. On July 5 the Bethlehem Steel Co. announced a decline of $10 per ton to $5.75 and this soon was followed by the leading interest. Between July 5 and the middle of August a general weakness developed and the American company met the market quoting $10 per ton under the Bethlehem price of July 5, of $5.75, or $5.25. The last cut of $10 per ton, making a total decline of $45 per ton in 11 months came when the American company on Nov. 3 announced its price of $4.75 for the first quarter of 1922 to jobbers and for the first half to manufacturers.

Average Monthly Prices of Tin Plate 1913-1921

Per base box, Pittsburgh

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921....	$7.00	$7.00	$7.00	$6.65	$6.25	$6.25	$5.65	$5.25	$5.15	$5.00	$4.80	$4.75
1920....	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1919....	7.35	7.35	7.25	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1918....	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75	7.75
1917....	6.875	7.00	7.50	7.50	7.90	9.25	10.00	10.00	10.00	10.00	8.20	7.75
1916....	3.75	3.75	4.15	4.70	5.15	5.55	5.80	6.00	5.60	5.75	6.05	6.50
1915....	3.10	3.10	3.10	3.20	3.20	3.10	3.10	3.10	3.10	3.10	3.35	3.60
1914....	3.40	3.40	3.40	3.40	3.38	3.30	3.25	3.45	3.55	3.35	3.15	3.20
1913....	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.55	3.50	3.40

Bar Demand Much Restricted

Needs of Consumers So Limited in 1921 that Product Was a Drug on the Market—Former Minimum Price Became Maximum During the Year as Declines Were Steadily Made—Chicago Base Is Applied

FOLLOWING the usual rule of the steel industry, one extreme in 1920 has been followed by its opposite in 1921 and soft steel bars, difficult to obtain in the former year because demand exceeded possible production, were a drug on the market in 1921 because the needs of consumers were so restricted. Prices present a similar condition of opposite courses. The industrial board quotation of 2.35c, base Pittsburgh, maintained by the United States Steel Corp., was continued through the first quarter of 1921. Independent makers then were selling at a lower level. The leading interest finally reduced its price.

Signs of what might be in store for 1921 appeared in the last few weeks of the preceding year when the feverish demand ceased, cancellations became frequent and prices at the close of the year lost their buoyancy and came to a common level of 2.35c base.

In contrast to the obstacles met with in 1920 from labor troubles, insufficient railway service and fuel shortage, factors which prevented the mills attaining capacity operations when their books were filled with orders, the past year presented no brake upon production except lack of demand.

The debacle of the motor industry late in 1920 gave a severe blow to the steel bar market which lasted well into the following year. The plight of the farmer, with low prices for his products and high prices for his necessities, was reflected in the worst slump in the history of the agricultural implement industry. This buying factor was removed entirely from the market and it did not return during the year. Hope of railroad buying was held steadily.

The price situation as it developed through the year was perhaps the most interesting feature of the situation. In general the market declined more or less steadily throughout the year. With the leading interest continuing its policy of maintaining the industrial board quotation of 2.35c, Pittsburgh, independents quoted lower during the first month. At least $2 per ton was conceded by some. Soon after, prices as low as 2.00c and 2.10c, Pittsburgh, were made and the market remained on the basis of about 2.00c, on the part of independents until April 8, when the latter advanced to 2.10c, Pittsburgh. Five days later the United States Steel Corp. announced a reduction to 2.10c, Pittsburgh, making the whole market again on an even basis. July 5 the Bethelhem Steel Co. reduced bars to 1.90c, Pittsburgh, and the Steel corporation followed the next day. Independents again reduced prices July 22, naming 1.75c.

Bar Iron Prices, Chicago 1917-1921

	1917	1918	1919	1920	1921
January....	3.00	3.50	3.13	3.13	2.76
February...	3.00	3.50	2.95	3.44	2.66
March.....	3.00	3.50	2.86	3.50	2.63
April.....	3.19	3.50	2.58	3.75	2.48
May.....	3.39	3.50	2.50	3.75	2.45
June.....	4.00	3.50	2.53	3.75	2.22
July.....	4.50	3.50	2.62	3.75	1.96
August....	4.50	3.50	2.62	3.75	1.75
September..	4.50	3.50	2.62	3.75	1.75
October....	4.50	3.50	2.68	3.75	1.75
November..	4.10	3.50	2.73	3.75	1.70
December..	4.10	3.50	2.77	3.50	....

A feature of the year was the appearance of a Chicago base in August when the market in the West divorced itself from the East and developed quotations independent of the Pittsburgh base. This condition continued to the close of the year. The quotation at Chicago frequently was as low as at Pittsburgh, all the freight advantage being sacrificed at times. In the effort to keep up mill operation in the face of small buying, quotations of 2.00c to 2.13c, Chicago, were bid in August, 1.75c, Chicago in September and 1.50c to 1.60c, Chicago, later in the year. In the later weeks Pittsburgh and eastern makers lowered to 1.50c.

Bar iron was a sorry spectacle the entire twelve months, steel bars being so cheap that they were substituted. At the beginning of the year the market was quoted at 2.68c, Chicago, for common iron bars and 3.50c, Pittsburgh, for refined bars. Prices declined to 1.65c, Chicago, by slow stages and to a range of 2.05c to 2.15c.

Hard steel bars rerolled from old rails were a drug on the market for the most part and many mills of this character were idle all year. Others ran only part time and usually at a loss. Prices ranged from 2.50c, mill, early in the year, to 1.60c, mill.

Cold-finished bars had a similar course to that of plain bars and declined by steady degrees from 3.60c, Pittsburgh, at which they opened the year to 2.00c, Pittsburgh, at the close. Concessions from the lower price were being made by holders of stocks which were pressing for sale. This market was on two levels much of the time, the American Steel & Wire Co. maintaining the 3.60c quotation until April 21 when it reduced to 3.10c, Pittsburgh. After a continuing fall of the market, the same interest in October made 2.35c, Pittsburgh, its price.

Hoops and bands were in light demand all year and quotations declined from 3.05c, Pittsburgh, to an extreme of 1.75c, Pittsburgh.

Average Steel Bar Prices, by Months, 1907-1921

Cents per pound, base, Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January.....	1.60	1.60	1.40	1.49	1.40	1.15	1.40	1.20	1.10	1.86	2.95	2.90	2.70	3.10	2.35
February.....	1.60	1.60	1.30	1.45	1.40	1.13	1.41	1.22	1.10	2.01	3.00	2.90	2.70	3.85	2.14
March.....	1.60	1.60	1.20	1.45	1.40	1.11	1.40	1.22	1.15	2.34	3.20	2.90	2.60	3.85	2.00
April.....	1.60	1.60	1.15	1.45	1.40	1.17	1.40	1.17	1.20	2.50	3.40	2.90	2.35	3.65	2.07
May.....	1.60	1.60	1.20	1.45	1.40	1.20	1.40	1.17	1.20	2.50	3.50	2.90	2.35	3.25	2.10
June.....	1.60	1.50	1.20	1.45	1.25	1.21	1.40	1.13	1.20	2.50	3.65	2.90	2.35	3.25	2.06
July.....	1.60	1.40	1.25	1.45	1.24	1.25	1.40	1.12	1.26	2.50	3.90	2.90	2.35	3.25	1.86
August.....	1.60	1.40	1.35	1.40	1.20	1.25	1.40	1.17	1.30	2.50	4.00	2.90	2.35	3.25	1.75
September....	1.60	1.40	1.40	1.40	1.17	1.34	1.40	1.19	1.34	2.60	3.75	2.90	2.35	3.25	1.66
October.....	1.60	1.40	1.40	1.40	1.11	1.40	1.40	1.18	1.41	2.60	2.90	2.90	2.35	3.25	1.60
November....	1.60	1.40	1.45	1.40	1.08	1.40	1.34	1.19	1.65	2.78	2.90	2.90	2.45	3.00	1.50
December....	1.60	1.40	1.50	1.40	1.12	1.40	1.22	1.07	1.74	2.90	2.90	2.90	2.50	2.55	1.50

Ferro Supply Almost Exhausted

Consumption in 1921 Ahead of Production and Importation, Causing Partial Depletion of Stocks—Only One Furnace Producing in America and One in Britain at Year End—Other Alloys Depressed

LIQUIDATION featured the ferromanganese market all through 1921, and the end of the year found stocks practically depleted both in the United States and Great Britain. Normal consumption of ferromanganese in the United States is approximately 28,000 tons per month. At present, consumption is only about 15,000 tons per month, and, based on ingot production, the indicated consumption for the year was approximately 150,000 tons. Against this figure, domestic production during the year was approximately 100,000 tons, and importations were expected to reach 8000 tons, supplies thus aggregating about 108,000 tons. In other words, consumption was 42,000 tons in excess of the supplies, and the difference represented the extent to which stocks were reduced in this country during the year.

While figures are not available as to stocks on hand at consuming plants, buying was entirely for actual consumption and practically all consumers sought to work down their stocks to the lowest point consistent with safety, so as to have small inventories at the close of the year.

It can be estimated, however, that the manufactured stocks of ferromanganese in merchant producers' hands in the United States at the close of the year were about 10,000 tons, which is less than three weeks' supplies for the United States or about six weeks' supply for consumers other than the United States Steel Corp. subsidiaries.

Manufactured stocks in merchant producers' hands in Great Britain toward the close of the year were about 8000 tons. While this is sufficient for two months for Great Britain at her present reduced rate of operations, Great Britain is the principal supplier for Europe as well as normally a large exporter to the United States. In fact, toward the end of the year, export shipments from England were increasing materially.

One development resulting from the great depletion of stocks was the lighting of the Sheridan, Pa., furnace of the Lavino Furnace Co., in December. This is the only merchant furnace now engaged in ferromanganese production in this country. Only one furnace is blowing on ferromanganese in England but in December there was some talk of blowing in additional stacks.

An important development of the year was the dismissal by the federal trade commission in November, of the complaint alleging violations of the so-called anti-dumping law in the sale of English ferromanganese in this country. The commission decided there was no evidence that the importers or their English principals have "dumped" metal in this country. Thus the status of English ferromanganese in the United States is practically the same as before the war. In this connection it is of interest to note that the importers of English metal made the market here most of the year. Domestic makers generally quoted on a tidewater basis so that their delivered prices were exactly the same as those quoted by the importers.

Future market developments in ferromanganese will be governed to a large extent by the action that is taken by the senate with reference to the Fordney bill which passed the house of representatives last July. This bill provided for a duty of 2 1/5 cents per pound on the metallic manganese in ferromanganese containing in excess of 1 per cent carbon. On manganese ore it provided a duty of 1 cent per pound on the metallic manganese contained. If this bill becomes a law, the duty on 80 per cent ferromanganese would be nearly $39.50 per gross ton, and on 50 per cent manganese ore the duty would be $11.20 per gross ton. These rates excited great opposition from ferroalloy consumers during the tariff hearings of the senate. Every rate in the Fordney bill now hinges upon the American valuation plan and it appeared at the close of the year that the American valuation plan as contained in the Fordney bill was satisfactory neither to the senate or the

FERROMANGANESE PRICES

Delivered Pittsburgh

	1921	1920	1919	1918
January	$101.00	$146.00	$212.50*	$250.00
February	96.85	160.00	165.00	250.00
March	89.00	172.00	134.00	250.00
April	87.50	200.00	113.75	250.00
May	83.00	200.00	110.00	250.00*
June	76.50	198.00	111.75	250.00*
July	75.00	190.00	111.00	250.00*
August	70.75	193.75	110.00	250.00*
September	64.75	172.40	105.00	250.00*
October	61.65	156.40	110.00	250.00*
November	60.00	153.00	110.00	250.00*
December	60.00	120.00	121.00	236.00*

*Prices from May, 1918, to January, 1919, inclusive, were based on 70 per cent ferromanganese. All other prices in above table were based on 80 per cent metal.

SPIEGELEISEN PRICES

At Producers' Furnaces

	1921	1920	1919	1918	1917
Jan.	$46.25	$46.60	$67.50*	$59.00	$57.50
Feb.	37.75	57.60	52.50*	59.00	66.25
March	34.20	60.40	42.50*	65.50	77.50
April	32.00	66.85	34.50*	70.00*	76.75
May	31.75	75.00	31.35*	71.00*	78.00
June	29.60	75.00	27.50*	75.00*	83.00
July	27.50	75.00	34.00	75.00*	85.00
Aug.	26.20	79.35	34.00	75.00*	81.25
Sept.	25.25	82.00	34.00	75.00*	80.50
Oct.	24.85	80.00	34.00	75.00*	73.50
Nov.	25.00	74.35	34.00	75.00*	63.25
Dec.	25.00	.....	39.00	72.50*	60.00

*Prices from and including April, 1918, and to and including June, 1919, are for 16 per cent spiegeleisen. All other prices apply to 20 per cent metal.

Imports and Domestic Production of Manganese Alloys—Imports of Manganese Ore

	Production		Imports		Imports
	Ferro-manganese	Spiegel-eisen	Ferro-manganese	Spiegel-eisen	Manganese ore
1921*	100,500	54,992	10,300	.....	451,000
1920	286,365	110,685	59,254	.....	601,437
1919	175,009	84,014	33,022	.....	333,344
1918	325,133	303,535	27,168	.....	491,303
1917	328,000	187,000	51,800	.....	663,500
1916	275,204	187,233	90,928	.....	576,321
1915	144,260	114,556	55,263	200	313,985
1914	100,731	76,625	82,997	2,870	283,294
1913	119,495	106,980	128,070	77	345,090
1912	125,378	102,561	99,137	1,015	300,661
1911	74,602	104,013	80,263	20,970	176,852
1910	71,376	153,055	114,228	25,383	242,348
1909	82,209	142,831	88,934	16,921	212,765
1908	40,642	111,376	44,624	4,579	178,203
1907	55,918	283,430	87,400	48,994	209,021
1906	55,520	244,980	84,359	103,268	221,260
1905	62,186	227,797	52,841	55,457	257,033

*Estimated on basis of 11 months.

administration and some modification was expected in this connection.

At the beginning of the year importers and domestic makers were asking $110, tidewater, on standard ferromanganese, but the market was largely dominated by resale material which was changing hands at $90 to $110 delivered. Prices steadily declined until in September an importer sold a round tonnage of English metal at $58.35 tidewater. With two exceptions this price through the remainder of the year indicated the general market on English and domestic metal.

In October, the Brier Hill Steel Co. bought 100 tons of German ferromanganese at $60 delivered Youngstown, or $53.56, Baltimore. This was the first sale of German ferromanganese in this country since before the war.

In connection with prices, it is interesting to note the parallel between ferromanganese and basic pig iron. For a period of 10 years before the war, the average price of ferromanganese was $47.50 at Atlantic ports while basic pig iron averaged $15.50 valley furnaces, or in a ratio of 3.06 to 1. During the war the ratio averaged 6.35 to 1 and at one time went to 8.3 to 1. At the close of the year, with ferromanganese at $58.35 seaboard, and basic pig iron at $19 valley, the ratio was 3.07 to 1, or practically on the prewar basis.

Due to the liquidation in ferromanganese prices, the importance of spiegeleisen as a raw material was much less than usual. No spiegeleisen was produced in the country after July. At the beginning of the year prices on 20 per cent metal ranged from $45 to $50 furnace. During the last quarter the market was $24 to $26 and some good sized lots were sold at even less. By the close of the year, stocks on hand both at furnaces and at consumers plants had been materially reduced.

Importations of manganese ore, on contracts that had been placed at high prices, were on a large scale in the early part of 1921 but tapered off so that the movement toward the close of the year was negligible. However, the total importations during the year were considerably above 350,000 tons, so that, with a production of less than 20,000 tons of ferromanganese in the second half, it is apparent that the stocks of ore at furnaces at the end of the year were fairly heavy.

Extreme depression marked all the special ferroalloys throughout 1921. Alloy steel consumers began the year with stocks of steel on hand and makers had stocks of ferroalloys and steel. The dull condition of the automobile industry and of general business made the liquidation of these stocks a slow process. New buying was comprised largely of comparatively small lots for assured requirements. The situation was complicated by the low priced offerings of foreign metal facilitated by exchange rates, and this material in competition with resale offerings of domestic alloy was largely instrumental in fixing the market prices in this country.

The markets for tungsten, both concentrates and alloy, reached unprecedentedly low prices in 1921. As the year began ferrotungsten was quoted 57½ cents a pound contained, against a prewar average price of about 70 cents. But the pressure of unwieldy stocks caused a steady decline, until prices reached levels that induced banks having loans against stocks of alloy to force sales. As the year came to a close the market was quoted 35 to 40 cents a pound contained. The ore market also dropped to $2.00 to $2.50 a short ton unit, as against $6 prewar average.

Ferrochrome prices declined 5 to 6 cents in 1921 as against 1920. Only two or three domestic companies continued to manufacture ferrochrome and most of their operations were against contracts entered into late in 1920. Prices of 14 to 15 cents a pound contained were maintained for alloy carrying 6 to 8 per cent carbon. Importers were active participants in the market. French 6 to 8 per cent alloy was offered from store at 9½ cents a pound contained. Norwegian 6 to 8 per cent ferrochrome sold at 10 cents. Demand for the low carbon grades was slack most of the year. Chrome ore prices declined to 40 cents.

Although ferrovanadium was the only alloy which in 1920 experienced steady activity in 1921 this product shared the general dullness. The leading interest closed all its mining properties and the world output almost ceased. Considerable resale lots changed hands at declining prices. At the close of 1920 the price of high grade ferrovanadium was $7 a pound contained, while in 1921 the price dropped to $4.50 to $5, closing the year at that price.

Domestic production of ferrosilicon was curtailed drastically in 1921, the market being dominated by Canadian material, and resale offerings. At the close of 1920, 50 per cent ferrosilicon was quoted $80 to $85 a ton. Early in the year efforts were made to maintain a price of $90 to $95 delivered, but these failed and the market sagged until November, when sales were made at $50 to $55. In December, 1921, the market was $57.50 to $60 delivered.

Demand for Warehouse Materials Fair

JOBBERS of iron and steel products experienced a fair year. However, they encounter a falling market all the way which made losses inevitable on inventory and at the same time retarded buying. As mills had little business they sought smaller tonnages from consumers and to some extent cut into the usual sources of store buying. Prompt deliveries from mills were more easily obtained than usual, and as buying was largely for immediate deliveries, warehouses suffered considerable loss in demand.

Prices in general followed the decline of mill quotations and were as steadily downward. The schedule received its first important cut in March when a Pittsburgh store issued a list of lower quotations. The warehouses of the leading producer followed immediately. An advance in mill sheets in September was not followed by jobbers, as the higher price was not uniform.

About the middle of the year the volume of sales by warehouses was estimated at 35 per cent compared with 1920. This was in line with reduced output of mills and indicates that these distributors were holding their own fairly well.

Changes in method of quoting to out-of-town buyers were made at Philadelphia and New York, where peculiar conditions exist. The first plan was to deduct one per cent from the local delivered price and add freight to destination. Later 10 cents was deducted from the local delivered price in Philadelphia and freight to destination was added.

During most of the year warehouses bought sparingly from mills, but were able to assort their stocks to a better ballance, while keeping all lines at a lower mark than usual. In this way they avoided as far as possible the accumulation of an excess of material while prices were declining. Late in the year a small tendency toward buying was noted.

Plates Marked by Price Decline

December Quotation of 1.50c Base Pittsburgh, Nears 1904-13 Average of 1.498c—Makers Unable To Stabilize Market—Purchases at 25 Per Cent Normal—Oil Companies Heaviest Buyers—Issue New Export Card

OUTSTANDING among steel market developments during 1921 was the remarkable liquidation in plate prices from the high levels prevailing in 1920 and during the war period. Finished steel prices were entirely liquidated during 1921. Plates, shapes and bars, sold at lower prices in December than the 10-year prewar average prices. Over the period 1904—1913, inclusive, the average selling price of plates was 1.498 cents per pound, base Pittsburgh. While the plate market in December has been regarded as 1.50c, base Pittsburgh, numerous sales were made during the month at prices much lower than this figure. On some attractive business, the equivalent of less than 1.35c, base Pittsburgh, was done.

In fact, prices on plates, shapes and bars were liquidated to a greater extent than other iron and steel products. For instance, basic pig iron at valley furnaces about Dec. 20 was quoted at $18.25, which compared with the 10-year prewar average price of $15.43. As the steelmakers freely admitted, the prices they quoted in 1921 were made without respect to costs of production. Freight rates on iron and steel raw materials combined were higher by about 100 per cent than the rates prevailing in 1914, common labor at steel plants still is receiving on an average 50 per cent more pay than in 1914, and the cost of living in the second half of 1921 averaged 60 to 65 per cent higher than in 1914. Therefore, the selling prices of plates were dictated alone by the desperate efforts which the steel manufacturers made all through the year to keep their mills operating. Normal plate requirements of the United States are regarded as approximately 5,000,000 tons, and the record output was nearly 5,120,000 tons of plates in 1918. While it is impossible to indicate accurately the extent of plate buying in 1921 it seems certain that output for the year did not average higher than 20 to 25 per cent of the 1918 tonnage. Mills in some rare instances reached 70 per cent of their capacity for brief periods.

The heaviest buying of plates during 1921 came from the oil companies which bought large tonnages for stills and storage tanks. Much tonnage also went into boilers and other equipment for the oil districts. Car and locomotive building absorbed much tonnage. Miscellaneous buying was fair. The real causes of the disastrous year in plates were the recession of the big demands from the shipbuilding industry and falling off of export buying.

Platemakers at the end of 1921 expected the volume of business in 1922 would be better than in 1921. This opinion was based not only on the conditions in each consuming industry, but also on the fact that midsummer appeared to mark the ebb of the tide and plate orders increased in volume toward the end of the year and especially in October and November.

Several attempts were made during the year to stabilize the market but without success. In January plates were quoted at 2.65c, base, Pittsburgh. While the United States Steel Corp. subsidiaries adhered to this figure, shading by independents carried the market down to 2.00c to 2.10c, Pittsburgh, by the end of March. In April, the Steel corporation reduced from 2.65c to 2.20c and the independent makers who had quoted lower advanced to the new Steel corporation figure. Shading was resumed and the market by the end of June had sagged to as low as 1.90c. Early in July the Bethlehem Steel Co. announced a cut from 2.20c to 2.00c and all makers for a time quoted the 2.00c price, but a resumption of shading carried the market down to 1.70c and 1.75c, and in Chicago the equivalent of 1.40c, Pittsburgh, was done. Late in July, the Steel corporation adopted a 1.85c base price but, finding business was going lower, it soon established a policy of meeting competition. Late in September the Steel corporation subsidiaries attempted to stabilize the market at 1.75c but without success. The Brier Hill Steel Co., in October advanced to 1.85c but without result. At the close of the year it was easy to place plate orders at 1.50c, base, Pittsburgh, and on attractive orders lower than the equivalent of 1.35c, Pittsburgh, was done in some cases both in the East and the West. All during the year there was a tendency on the part of mills located away from Pittsburgh to ignore the Pittsburgh basing system. This tendency was pronounced all during the year at Chicago, and became more noticeable in the East in the latter part of the year.

A feature of the export market was a new plate extra card which the United States Steel Products Co. issued as of Oct. 1. This card set forth lower extras than the previous card which had prevailed since April 1, 1919. The old card, for instance provided an extra of 10 cents per 100 pounds for hull steel to Lloyd's specifications; this extra is waived in the new card. The old extra on regular sketches with a length of three feet or more was 30 cents and the new extra is 20 cents. The old extra on irregular sketches was 60 cents and the new one is 30 cents. The old extra for gages under ¼-inch to and including 3/16-inch was 25 cents and the new one is 15 cents. Other extras were reduced proportionately.

Tank Plates, Pittsburgh

Cents per pound, base Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	1.70c	1.70c	1.60c	1.55c	1.40c	1.15c	1.45c	1.15c	1.10c	1.85c	3.60c	3.25c	3.00c	3.10c	2.65c
February	1.70	1.70	1.45	1.55	1.40	1.10	1.45	1.20	1.10	2.15	3.75	3.25	3.00	3.70	2.30
March	1.70	1.70	1.30	1.50	1.40	1.10	1.45	1.20	1.15	2.50	4.20	3.25	2.90	3.75	2.00
April	1.70	1.70	1.20	1.50	1.40	1.20	1.45	1.15	1.10	2.65	4.50	3.25*	2.65	3.65	2.15
May	1.80	1.70	1.25	1.50	1.40	1.25	1.45	1.10	1.15	2.75	4.50	3.25	2.65	3.50	2.20
June	1.80	1.65	1.30	1.45	1.35	1.25	1.45	1.10	1.15	2.75	4.50	3.25	2.65	3.50	2.00
July	1.80	1.60	1.35	1.40	1.35	1.30	1.45	1.10	1.20	2.85	5.65	3.25	2.65	3.50	1.85
August	1.70	1.60	1.40	1.40	1.30	1.35	1.45	1.15	1.15	2.90	6.80	3.25	2.65	3.50	1.75
September	1.70	1.60	1.50	1.40	1.25	1.40	1.40	1.20	1.30	2.95	6.85	3.25	2.60	3.50	1.65
October	1.70	1.60	1.50	1.40	1.20	1.45	1.35	1.15	1.40	3.00	3.25	3.25	2.65	3.20	1.60
November	1.70	1.60	1.55	1.40	1.10	1.50	1.25	1.10	1.60	3.35	3.25	3.25	2.65	3.00	1.55
December	1.70	1.60	1.60	1.40	1.15	1.55	1.20	1.05	1.75	3.50	3.25	3.25	2.70	2.65	1.50

Rail Buying Declines During 1921

Release of Suspended Tonnages and Bookings for 1922 Follow Cut to $40 a Ton—Bessemer Market Practically Eliminated—World's Rail Output Record Broken—Inland Steel Co. Becomes Producer

DESPITE the generally small output in the steel industry as a whole, at least one production record was established in 1921. This was in steel rails. The Gary, Ind., mill of the Illinois Steel Co. in March produced 92,600 tons, a world's record. When the year started, the Gary mill had approximately 1,000,000 tons of rails on order and the railroads were anxious for deliveries. Other departments of the plant were operating below capacity so there was a plentiful supply of steel for the rail mill. The March figure, however, stood as the record of the year. The railroads from that time on began to show less anxiety with respect to rail deliveries and in many cases they requested unfilled orders be suspended.

Unquestionably a cause of some of the suspensions was the great difficulty which the railroads encountered in reducing wages and other operating costs. Another cause was the maintenance by the mills of the price level that prevailed at the close of 1920. This was $47, base, mill, for open-hearth rails and $45 for bessemer. Steelmakers generally pointed out their own costs would not justify any reduction in the rail prices, and they said a reduction in freight rates on their raw materials first must be made. Buyers of rails in turn pointed out that the $47 price on open-hearth rails was equivalent to practically 2.10c a pound at the mill. They were satisfied with this price while plates, shapes and bars sold at this level or higher. But the prices on plates, shapes and bars even in March averaged 2.00c to 2.10c, base, Pittsburgh, and they continued to recede until the rail price looked high by comparison. On Oct. 22, Chairman E. H. Gary of the United States Steel Corp., announced a cut of $7 a ton, to $40, base, mill, to apply to all undelivered tonnage as well as new business, and this price was at once met by other makers. As a result, large suspended tonnages immediately were ordered forward.

The price cut announced by Judge Gary represented a departure from the past inasmuch as the customary differential of $2 between open-hearth and bessemer rails was omitted, but was in line with fundamental changes in the character of the rail demand in recent years. Prior to 1900, the open-hearth rail production was negligible while the production of bessemer rails still was in the ascendancy. From 2,383,654 tons in 1900, bessemer output rose to its peak of 3,791,459 tons in 1906. Since then its decline has been rapid until in 1920 only 142,899 tons were rolled, representing only 5.49 per cent of the total rail output of the country. On the other hand, open-hearth rail production, starting with 1333 tons in 1900, has grown steadily until it reached the high point of 2,527,710 tons in 1913. In 1920 the output was 2,334,222 tons. Practically all American railroads in the past few years have specified only open-hearth rails. Some of the leading mills, including those of the United States Steel Corp., now are virtually out of the bessemer rail business. The omission of the $2 differential simply marked the passing of the bessemer rail market.

Considerable of the tonnage rolled in 1921 was placed with the mills in January. Buying for 1922 started in December. Present indications are that rollings for domestic roads will not be as large in 1922 as in 1921. The New York Central railroad placed 175,000 tons for 1921, while for 1922 it closed only 125,000 tons with options for 25,000 tons additional. For 1921, the Pennsylvania placed 200,000 tons, while the indications on Dec. 15 were that this road would place for 1922 a total not to exceed 150,000 tons. In fact, generally, the various roads have taken less tonnage for 1922 than for 1921.

Steps were taken during 1921 to add another mill to the standard section rail capacity of the country. The Inland Steel Co., Chicago, fitted its 28-inch structural mill for rolling heavy rails and it is expected this interest will begin to produce rails March 1. Its capacity will be 2000 tons a day, or half that of the Gary mill. The Inland company shared in the 1922 tonnage.

Despite fears held as to the ability of American mills to take rail business abroad in competition with Germany and Belgium, such orders came here in good volume. Practically all of these were from China and Japan. One was from Honduras. Most of the export orders were booked at prices considerably lower than those prevailing in the domestic market. The United States Steel Products Co. in September took an order for 4000 tons of rails for Japan at a price equivalent to about $37.50, f.o.b. Atlantic port. In November the Consolidated Steel Corp. took 7000 tons for Japan at $45, c.i.f. Yokohama.

The average prices paid for steel rails in the United States from 1901 to 1922 follow:

1921	$45.68
1920	52.64
1919	47.50
1918	57.00
1917	38.00
1916	32.75
1902 to 1915	28.00
1901	27.40

Car orders in 1921 involved little less than half the number placed in 1920, but exceeded by little more than 50 per cent the number bought in 1919. The 1921 total was approximately 32,250 cars. The heaviest buying was in October, when 8500 cars were placed. In November, approximately 7000 cars were awarded. Buying in any one of the other months did not involve many more than 3000 cars. Foreign orders comprised about 3500 cars, virtually all of which went to the Orient and South America. A feature of the activity in the car market during the past year was a large number of car repair orders. Much of the business during the summer and early fall months was for this work.

Following is a comparative statement

Light Rail Prices by Quarters, 1913-1921

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Jan. 1	1.25c	1.25c	1.07c	1.55c	$50.00	3.00c	2.75c	2.45c	2.75c to 3.00c
April 1	1.25c	1.25c	1.07c	2.10c	55.00	3.00c	2.45c	2.45c to 3.25c	2.15c to 2.50c
July 1	1.25c	1.25c	1.07c	$47.00	$70-$80	3.00c	2.45c	2.45c to 3.75c	1.90c to 2.20c
Oct. 1	1.25c	1.25c	1.25c	47.00	75.00	3.00c	2.10c to 2.45c	2.75c to 3.75c	1.65c to 1.75c
Dec. 27									1.50c to 160c

THE IRON TRA

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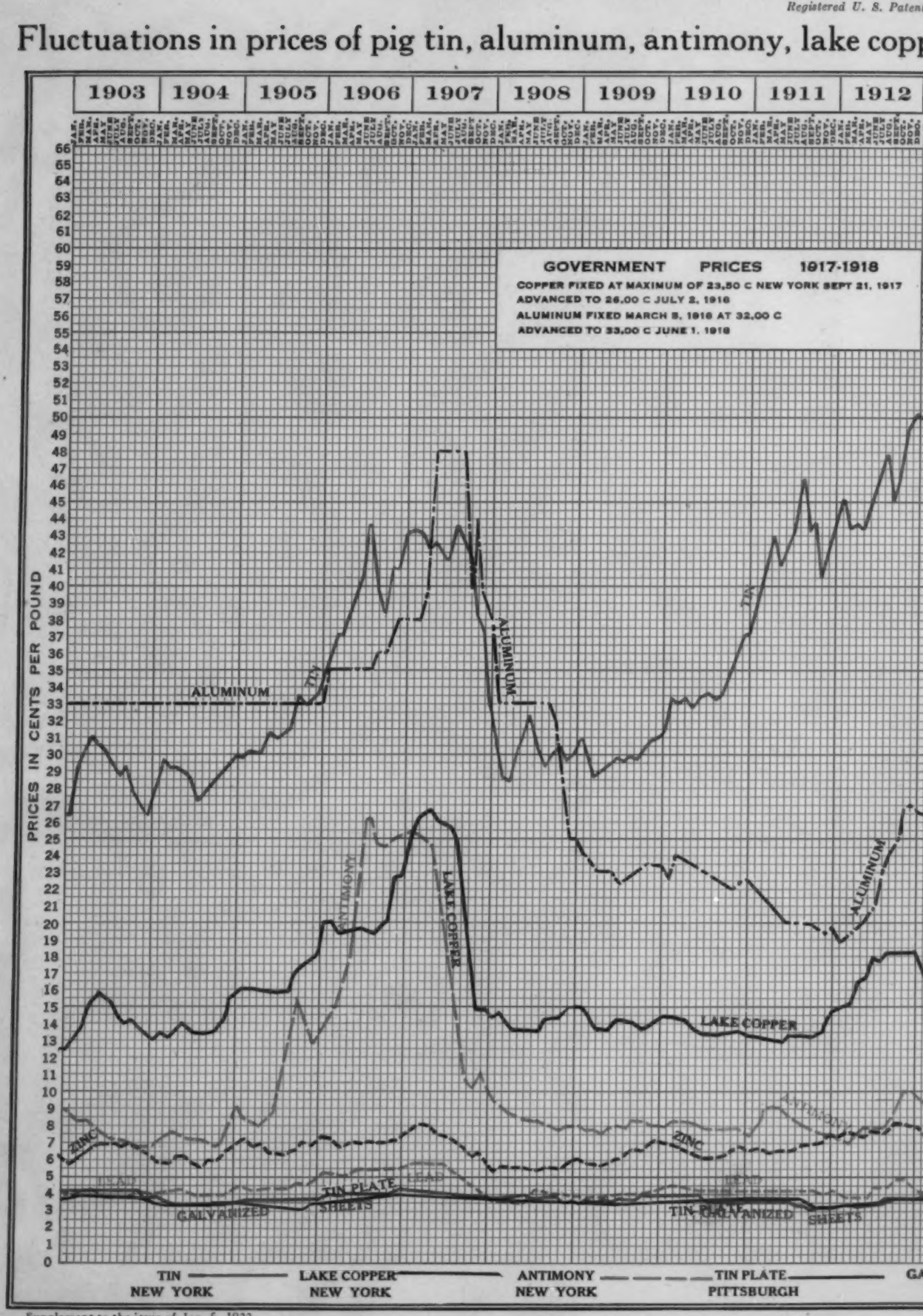
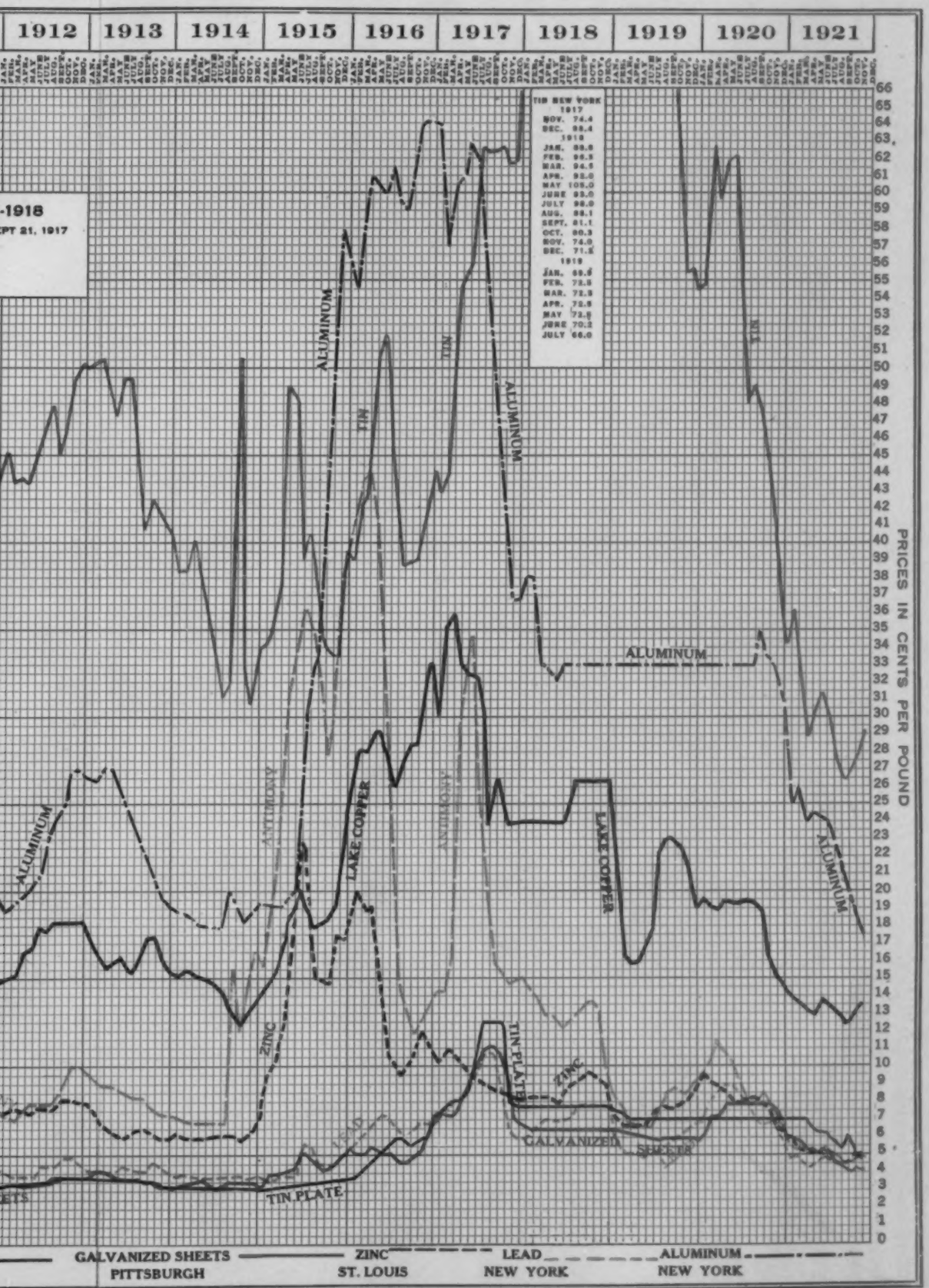
Fluctuations in prices of pig tin, aluminum, antimony, lake copp



RADE REVIEW

d U. S. Patent Office

ke copper, zinc, lead, tin plate and galvanized sheets, 1903-1921



of the number of cars bought in 1921:

	1921	1920	1919	1918
January	3,100	3,120	3,180	200
February	210	7,030	60	4,575
March	2,400	4,220	150	2,190
April	425	19,530	575	31,150
May	275	7,100	360	70,165
June	1,800	4,025	1,010	400
July	2,500	5,510	2,510	30,000
August	440	6,980	2,125	10,000
September	2,560	1,800	3,975	4,000
October	8,500	4,435	4,750	40,900
November	7,035	....	350	200
December	3,000*	2,240	1,000	8,000
Total	32,255	65,980	20,045	201,780

*Estimated.

Locomotives ordered in 1921 numbered about 400 and included several sizable export awards. One order called for 75 locomotives for Argentina and another for 50 for Mexico. Outstanding domestic orders included 50 locomotives for the Santa Fe railroad.

Most of the orders for light rails during 1921 were in carload lots but fewer than in former years. Occasionally as much as 350 to 500 tons were purchased at a time, particularly in November when some of the larger coal interests took such tonnages. The month's aggregate proved to be a fairly sizeable tonnage and in the first half of the year some mills found their output of light rails to be their mainstay in operations. Most of the buying last year was by coal and traction interests.

Two strikes which did not materialize, had opposite effects upon the light rail demand. First the threatened railroad strike in October brought about extra ordering. The threatened coal strike, early in November, served as a deterrent.

Prices, like those of other steel products, declined regularly, the year starting at 3.00c, base Pittsburgh, and closing at 1.55c. All year keen competition was encountered from the rerolling mills.

Prospects for light rails in 1922 are bright since improvement in the coal industry is expected; the lumber trade which was a light buyer in 1921 promises to be a more active market factor; an improvement in industry generally may see industrial companies increasing their trackage.

Wire Needs Drop Below Mill Capacities

ABRUPT transition from the feast of 1920 to the famine of 1921 has marked the wire and nail market. For the first time in at least three years mills had a clear track for full operation and production, after strikes and transportation difficulties had been cleared, but orders were lacking. At no time during the year were mills at capacity.

Yet this department was in better position as to demand than in most finished steel products. At a time when farmers were on the so called buying strike, due to low prices on their products, and while building conditions were at low ebb, because of labor troubles and high costs of building, nails were in demand to an extent which was surprising.

Prices declined to the middle of the year and regained part of the loss in last half. Two events stand out most important in the wire market. The first was a reduction of $10 per ton on both wire and nails July 8, when the American Steel & Wire Co., announced a change from 3.25c to 2.75c, Pittsburgh, on nails and from 3.00c to 2.50c, Pittsburgh, on wire. The second was an advance Sept. 10 by the same interest to 2.90c and 2.60c.

On Dec. 21, the American Steel & Wire Co. announced a formal reduction to 2.50c, Pittsburgh, on nails, and to 2.25c on wire.

While both plain wire and nails had been quoted early in the year at 3.25c, Pittsburgh, some independents in February re-established the former differential of $5 per ton and marked wire down to 3.00c, Pittsburgh. Almost immediately shading on wire began to be apparent and 2.75c, Pittsburgh, was done readily. Lower prices failed to bring additional business and after about 60 days the market was restored to its former level. This apparent upward movement caused jobbers to add to their stocks and consumers to lose their waiting attitude. A buying movement then started.

Demand and sales continued to improve, however, and reached a position practically normal for the midyear, which usually is a time of slack demand. Jobbers had not laid in stocks and orders from consumers went through to mills at once. In June some producers cut wire $5 to 2.75c, and nails to 3.00c, Pittsburgh, the American Steel & Wire Co. meeting competition. A downward adjustment of galvanizing extras was made, $5 on nails and $4 on wire.

Buying fell off in July and the American Steel & Wire Co. then established its first reduction. In spite of farmers buying as little as possible of everything, the West found demand holding up better than the East, and a normal volume was booked in the former through the summer. Jobbers also resumed taking nails and wire.

During 1921, for the first time in many years, wire producers were able to place stock in their warehouses. Stocks were built up partially, as occasion allowed and better shipment for immediate needs was possible. Jobbers were wary most of the year and did not have sufficient confidence in prices to carry much stock.

Because of the low price of cotton through part of the year, the South bought little of this material. This lost demand was felt severely. On the recovery of cotton prices, buying from that section was resumed. Late in the year a decline in cotton again cut down purchases.

Plain Wire Prices, 1915-1921

Cents per pound, base Pittsburgh

	1915	1916	1917	1918	1919	1920	1921
January	1.31	1.95	2.95	3.25	3.25	3.00	3.25
February	1.35	2.10	2.95	3.25	3.25	3.00	3.20
March	1.40	2.23	3.08	3.25	3.20	3.00	3.00
April	1.39	2.25	3.18	3.25	3.00	3.00	3.00
May	1.35	2.45	3.45	3.25	3.00	3.00	3.00
June	1.35	2.45	3.60	3.25	3.00	3.00	2.75
July	1.39	2.45	3.95	3.25	3.00	3.00	2.50
August	1.42	2.53	3.95	3.25	3.00	3.00	2.50
September	1.54	2.55	3.95	3.25	3.00	3.20	2.60
October	1.62	2.60	3.85	3.25	3.00	3.25	2.60
November	1.72	2.80	3.25	3.25	3.15	3.25	2.60
December	1.88	2.95	3.25	3.25	3.25	3.25	2.25

Wire Nail Prices, 1915-1921

Cents per pound, base, Pittsburgh

	1915	1916	1917	1918	1919	1920	1921
January	1.51	2.15	3.00	3.50	3.50	3.25	3.25
February	1.55	2.22	3.00	3.50	3.50	3.25	3.00
March	1.60	2.38	3.16	3.50	3.45	3.25	3.00
April	1.59	2.40	3.20	3.50	3.25	3.25	3.25
May	1.55	2.50	3.50	3.50	3.25	3.25	3.25
June	1.55	2.50	3.65	3.50	3.25	3.25	3.00
July	1.59	2.50	4.00	3.50	3.25	3.25	2.75
August	1.61	2.58	4.00	3.50	3.25	3.25	2.75
September	1.69	2.60	4.00	3.50	3.25	3.25	2.90
October	1.76	2.65	3.90	3.50	3.25	3.25	2.90
November	1.87	2.85	3.50	3.50	3.45	3.25	2.90
December	1.96	3.00	3.50	3.50	3.50	3.25	2.80

Shape Tonnages Gained Slowly

Orders Booked in 1921 Increase, After First Few Months, as Prices Decline—Operations of Fabricators Generally at 30 Per Cent—Industrial Construction Small—Most Shape Mills Are Kept Active

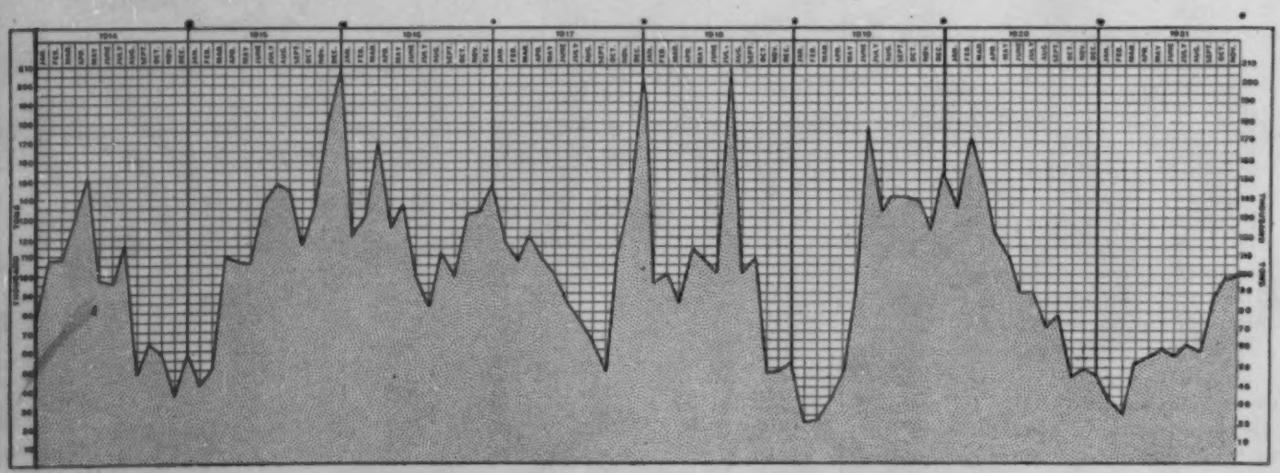
GRADUALLY increasing buying at steadily declining prices featured the structural steel market in 1921. That there should be this divergence from the normal procedure when prices during times of improving business usually firm up, is attributable largely to the fact that at no time was there sufficient market volume to put the mills and fabricating shops on anything like a tonnage basis. Few if any of the fabricating shops were able to get their operations up to much more than 30 per cent of capacity. It is interesting to note in this connection, however, that with the exception of a few of the shops of the United States Steel Corp., none closed down completely throughout the entire year.

Trading in 1921 included proportionately little industrial work. A fair amount of bridge building for the railroads came up in the last half of the year, but this at best was only relatively fair. The bulk of business was comprised of banks, loft buildings, apartment houses and miscellaneous municipal and civic construction, including a fairly good number of highway bridges. Incidentally much of this latter construction was undertaken in an effort to provide work for the unemployed. While this effort was being made, however, building was being given a severe setback a portion of the time by disputes in the building trades, particularly at various centers throughout the Middle West. In Chicago, construction was at a virtual standstill for a number of weeks, while in Detroit and Cleveland similar delay was encountered.

Despite considerable dullness, the year began with fabricating shops operating at around 50 to 60 per cent of capacity. The shape mills generally were not in such good position. With the exception of the United States Steel Corp., which was operating its mills at around 90 per cent, shapemakers were producing at around 40 per cent. Prices at that time were holding at 2.45c, Pittsburgh, on shapes and $110 to $120, a ton erected, on fabricated material. The break came in February, when a leading eastern independent announced a price of 2.25c, Pittsburgh, on shapes. By early the next month, the independent market had fallen to a range of 2.10c, to 2.25c, Pittsburgh, with finished material going at $100 to $105, a ton, erected. The end of the first quarter, found the market at 1.95c, Pittsburgh, on shapes and $92 to $95, erected, on fabricated material. These concessions, however, failed to attract much business, although in March there was an improvement in inquiry. In the New York district, demand was stimulated somewhat by a law which exempted new apartment houses from taxation for a period of 10 years.

Notwithstanding a slight improvement in buying during the second quarter, operations at the fabricating shops declined to around 25 per cent of capacity, and one of the United States Steel Corp.'s shops closed down for an indefinite period. It was early in April that the Steel corporation and most of the independents struck a common level of 2.20c, Pittsburgh, on shapes the former reducing its price from 2.45c, Pittsburgh, and the latter advancing their quotations anywhere from 5 to 30 points. This level, however, was not long maintained and by the end of the second quarter concessions were easily available. Throughout the greater part of this entire period, trouble in the building trades restricted activity in the Chicago district; at one time it was at a standstill. In a lesser degree, the Cleveland territory was affected. Judge K. M. Landis was appointed in June to arbitrate the Chicago dispute, but this ran along throughout the entire summer months.

Business in July and August was a trifle slower than in June, although considerably better than the average monthly bookings reported during the first half, and prices slumped off considerably. Fabricated steel by the latter part of August had reached a range of $67 to $70, erected, on general commercial work, while shapes were holding 1.75c, to 1.85c, Pittsburgh, with concessions available on especially desirable tonnages. Inquiry, though, was increasing rapidly, and in September, the month following, buying was the heaviest in more than a year, this being especially noticeable in the East, where many sizable tonnages were placed, including 15,000 tons for the Federal Reserve bank with the American Bridge Co.



GRAPHIC RECORD OF MONTHLY FABRICATED STEEL AWARDS, 1914-1921

Average Monthly Structural Shape Prices, 1907-1921

Cents per pound, base Pittsburgh

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	1.70	1.70	1.60	1.55	1.40	1.15	1.45	1.20	1.10	1.85	3.10	3.00	2.80	2.65	2.45
February	1.70	1.70	1.45	1.55	1.40	1.15	1.45	1.20	1.10	2.05	3.25	3.00	2.80	3.15	2.25
March	1.70	1.70	1.30	1.50	1.40	1.15	1.45	1.20	1.15	2.40	3.45	3.00	2.70	3.25	2.10
April	1.70	1.70	1.20	1.50	1.40	1.20	1.45	1.20	1.15	2.50	3.70	3.00	2.45	3.25	2.15
May	1.70	1.70	1.25	1.50	1.40	1.25	1.45	1.15	1.20	2.50	4.00	3.00	2.45	3.25	2.20
June	1.70	1.65	1.30	1.45	1.35	1.25	1.45	1.10	1.20	2.50	4.00	3.00	2.45	3.25	2.05
July	1.70	1.65	1.35	1.40	1.35	1.30	1.45	1.10	1.25	2.50	4.50	3.00	2.45	3.25	1.90
August	1.70	1.60	1.40	1.40	1.35	1.35	1.45	1.15	1.30	2.50	4.50	3.00	2.45	3.15	1.75
September	1.70	1.60	1.50	1.40	1.35	1.40	1.40	1.20	1.35	2.60	3.75	3.00	2.45	3.10	1.70
October	1.70	1.60	1.50	1.40	1.30	1.45	1.35	1.15	1.40	2.70	3.00	3.00	2.45	3.10	1.60
November	1.70	1.60	1.55	1.40	1.20	1.50	1.30	1.10	1.65	2.90	3.00	3.00	2.60	3.00	1.60
December	1.70	1.60	1.60	1.40	1.15	1.55	1.25	1.05	1.75	3.00	3.00	3.00	2.50	2.45	1.50

In the latter part of this month, the Steel corporation established a price of 1.75c, Pittsburgh, for shapes, this figure representing the maximum of the current market which ranged down to 1.60c.

The last quarter brought out further price concessions. Shapes were offered as low as 1.50c, Pittsburgh, and while a strenuous effort was made on the part of some fabricators to obtain a still lower figure, this price remained firm.

During the year fabricated material was sold down to $57 and $60, erected, although in the final month, offerings stiffened to around $65 to $70. Trading during this quarter exceeded that of any preceding corresponding three months of the year.

Among the larger contracts placed during the year were 15,000 tons for the Federal Reserve bank, New York city, previously mentioned as going to the American Bridge Co.; 15,000 tons for the Illinois Merchants bank, Chicago, also placed with the American Bridge Co.; 8000 tons for a Masonic Temple, Detroit; awarded to the Russell Wheel & Foundry Co.; 5000 tons for an addition to the Saks department store, New York city, awarded to the Hay Foundry & Iron Works; 7000 tons for a mail terminal in Chicago, placed with the McClintic-Marshall Co.; 8400 tons for the Hotel Statler, Buffalo, placed with the Fort Pitt Bridge Co., and 7000 tons for the Commonwealth hotel, New York city, awarded to the Hay Foundry & Iron Works.

Reflecting the volume of business placed during the past year are the following monthly tonnage awards as reported by the Bridge Builders and Structural society:

	1921	1920	1919	1918
January	32,000	135,000	21,000	95,400
February	25,600	171,000	22,500	99,900
March	52,300	150,400	22,300	84,600
April	55,900	122,250	48,100	115,200
May	50,800	110,700	88,200	108,000
June	66,900	90,400	117,000	100,800
July	60,200	90,400	133,200	209,700
August	59,300	72,000	141,000	162,000
September	86,000	77,400	141,000	108,000
October	97,800	45,600	139,500	77,400
November	99,800	49,200	124,200	48,700
December	....	47,000	153,000	52,270
Total	686,600*	1,161,350	1,161,400	1,201,970

*Eleven months.

Cast Pipe Business Gains as Prices Sag

THE decline from $55, Birmingham, to $35, Birmingham, or lower, in the base price of cast iron pipe during 1921 nearly tells the story of this market in the year just ended.

Difficulty of municipalities in selling their bonds early in the year hampered buying while the level of prices was a deterrent through much of the year. Better buying by industrial users and by contractors saved the day and the total volume of business actually done by makers was fairly good, all things considered.

Some unusually large inquiries were put out at times, Detroit and Akron being especially in the limelight. Not all the pipe asked for was bought, however, as there were many rejections, these cities being slow to place their large business at prices offered them. Other cities with smaller tonnages took practically the same attitude.

At the beginning of the year cast iron pipe shops had little tonnage on books and were hungry for new business. At the end of the year they had sufficient in most instances to keep busy to the last week, needed much tonnage for stocks on their yards and relied on early buying in 1922 to keep them going.

NEW YORK

	1917	1918	1919	1920	1921
January	41.50	55.35	66.20	67.30	63.30
February	41.50	55.35	62.70	70.30	63.30
March	41.50	55.35	61.65	71.30	63.30
April	51.25	55.35	57.70	73.30	63.30
May	55.50	56.55	56.70	76.30	61.30
June	60.75	61.35	52.70	76.30	52.70
July	65.50	62.30	52.70	76.30	48.55
August	65.50	62.50	53.10	76.30	47.05
September	65.50	62.70	54.30	77.20	45.30
October	55.75	67.70	56.70	77.20	47.55
November	56.10	67.70	58.30	77.20	47.30
December	54.70	67.70	61.30	77.20	.....

CHICAGO

	1917	1918	1919	1920	1921
January	41.00	54.30	64.30	67.55	64.10
February	41.50	54.30	61.80	71.30	64.10
March	43.70	54.30	60.55	72.80	64.10
April	53.00	54.30	56.80	74.40	64.10
May	55.50	55.50	54.80	76.80	64.10
June	60.75	60.80	51.80	76.80	51.50
July	65.50	62.07	52.60	76.80	47.60
August	65.50	61.85	54.80	76.80	44.35
September	65.35	61.80	55.80	81.50	42.90
October	57.75	66.80	59.80	83.10	42.60
November	53.10	66.80	59.80	83.10	42.60
December	54.25	66.80	63.80	83.10	.....

BIRMINGHAM

	1917	1918	1919	1920	1921
January	36.00	49.00	58.75	60.00	55.00
February	36.00	49.00	55.00	64.50	55.00
March	37.40	49.00	54.50	66.00	55.00
April	42.35	49.00	53.00	67.00	55.00
May	47.20	50.20	52.00	70.00	55.00
June	55.00	55.00	48.00	70.00	42.50
July	55.00	55.00	48.00	70.00	40.00
August	55.00	55.00	48.00	70.00	39.50
September	55.75	55.00	48.00	72.40	38.00
October	47.25	60.00	50.00	74.00	36.50
November	45.00	60.00	53.00	74.00	35.20
December	46.00	60.00	56.75	74.00	.....

Starting at $55, Birmingham, in January, prices were soon shaded in the effort to obtain orders. In June the announced price had sagged to $45, Birmingham, shading continuing until it was further reduced to $40, Birmingham.

This reduction, however, did not stop shading and in August the market was on a basis of $33.50, Birmingham, though some business went even lower in a few cases. Late in the year the lower prices stimulated buying and shops had a better backlog; the same scramble for tonnages was lessened and less shading was done.

The differential between class A and B pipe and between 6-inch and 4-inch pipe was advanced from $3 to $4 in the last half, being in effect an increase in price on part of the assortment.

Buyers Dictated Sheet Prices

Tonnage Inquiries Brought Out Many Quotations—Price Fluctuations and Erratic Mill Operations Featured—Outlook for the Future Is Fair Because of the Low State of Consumers' Stocks

DEMANDS for sheets during 1921 came from diversified consumers but because all were far from normal, prospects are bright for 1922. The forepart of the year saw heavy stocks in the hands of automobile manufacturers which were rounded out from time to time by new purchases. The liquidation of those stocks leaves a splendid avenue for the disposal of sheet tonnages in 1922. Closely identified with automobile sheets are electrical sheets, and while fair sized lots were bought in 1921, makers expect that electrical needs will be large during the present year. Sheets for railroad cars and locomotives were not ordered in large quantities last year, although tonnages of galvanized sheets for car repairs were fair and everything points to large buying of sheets by car and locomotive builders this year. Stove manufacturers did not buy tonnages commensurate with normal needs and considerable business is expected to develop from that direction. Building construction, which in large part was curtailed in 1921 is bound to form an outlet for large tonnages of sheets for metal lath, etc., since this year undoubtedly more buildings will be erected than was the case in 1921. Producers expect that various other sheet consuming lines which have taken small tonnages during the year just ended will register large gains in sheet consumption this year and believe they have every reason to be encouraged over the outlook for the year just entered.

Fluctuations in prices and mill operations were the outstanding features of the 1921 sheet market. Conditions the first eight months of the year were almost directly opposite to those which prevailed in the corresponding period of 1920. The lack of sheet demand which commenced in September, 1920 carried over for almost a year, or until the latter part of August, 1921, except for occasional spurts of activity. Then ensued a partial revival which did not gain much headway due to conflicting prices, and on Nov. 25 the American Sheet & Tin Plate Co. announced its prices for the first quarter of 1922, namely 2.25c, 3.00c and 4.00c, base Pittsburgh, on blue annealed, black and galvanized sheets, respectively.

The forepart of 1920 witnessed a keen demand for sheets accompanied by a scarcity of product. This past year witnessed the reverse with curtailed demand and an abundance of product available. The beginning of the year found independent makers and the leading interest on the same basis as regards price, namely the industrial board levels of March, 1919 which the American company had maintained all the previous year and to which the independents receded in December, 1920, namely 3.55c, 4.35c and 5.70c, base Pittsburgh, on blue annealed, black and galvanized respectively. The prevailing prices at the end of 1921, therefore, represented declines of $26, $27 and $34 per ton, respectively.

The year was not far advanced until a failing demand brought about concessions in fact, the middle of January saw the first cut on a round tonnage of blue annealed sheets purchased by an oil interest at $3 per ton under the market, or at 3.40c, base. Concessions constantly were available on blue annealed sheets, particularly on the heavier gages, due to competition from plate mill operators using the base price on plates.

Practically all year a buyers' market prevailed on all grades of sheets, since the issuance of a tonnage inquiry at any time seemed to be the signal for many makers to cut under the prevailing market figures. One

Average Monthly Sheet Prices, 1913-1921

Cents per pound, Pittsburgh

No. 28 BLACK SHEETS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1921	4.35	4.20	3.90	3.90	4.00	3.90	3.35	3.05	2.80	3.00	2.95	3.00
1920	5.00	6.00	6.00	6.00	7.00	7.00	7.00	7.00	7.00	7.00	6.05	4.47
1919	4.70	4.70	4.60	4.35	4.35	4.30	4.30	4.35	4.35	4.35	4.35	4.35
1918	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1917	4.55	4.55	5.05	5.75	7.00	8.15	9.00	9.00	8.75	7.75	5.30	5.00
1916	2.55	2.60	2.75	2.90	2.95	2.90	2.90	2.75	2.85	3.20	3.65	4.50
1915	1.80	1.80	1.80	1.80	1.80	1.80	1.75	1.85	1.90	2.05	2.20	2.50
1914	1.85	1.95	1.95	1.90	1.85	1.80	1.80	1.90	1.95	1.95	1.90	1.80
1913	2.30	2.35	2.35	2.35	2.35	2.30	2.25	2.20	2.10	2.00	1.95	1.90

No. 10 BLUE ANNEALED SHEETS

1921	3.55	3.35	3.05	2.95	3.10	3.00	2.55	2.40	2.30	2.50	2.40	2.25
1920	4.05	5.50	5.50	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.95	3.65
1919	3.90	3.90	3.80	3.55	3.55	3.50	3.50	3.55	3.55	3.55	3.55	3.55
1918	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25
1917	4.15	4.40	4.70	5.35	6.65	7.55	8.50	8.50	8.50	7.85	4.60	4.25
1916	2.45	2.60	2.85	3.00	3.05	3.10	3.00	3.00	2.90	3.15	3.30	4.00
1915	1.30	1.30	1.30	1.30	1.35	1.35	1.35	1.35	1.50	1.60	1.85	2.25
1914	1.35	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.40	1.40	1.40	1.35
1913	1.70	1.75	1.75	1.75	1.75	1.75	1.70	1.65	1.60	1.55	1.45	1.40

No. 28 GALVANIZED SHEETS

1921	5.70	5.50	5.05	4.90	5.00	4.90	4.35	4.05	3.80	4.00	3.95	4.00
1920	6.35	7.00	7.25	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.35	5.85
1919	6.05	6.05	5.95	5.70	5.70	5.65	5.65	5.70	5.70	5.70	5.70	5.70
1918	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1917	6.55	6.50	6.70	7.55	8.80	9.95	10.25	10.25	9.70	8.80	6.50	6.25
1916	4.75	4.75	4.80	4.85	4.85	4.80	4.35	4.25	4.20	4.45	5.05	6.25
1915	2.75	3.00	3.40	3.30	3.40	4.45	4.55	3.95	3.65	3.50	3.90	4.75
1914	2.85	2.95	2.95	2.90	2.80	2.75	2.75	2.85	2.95	2.95	2.85	2.80
1913	3.45	3.50	3.50	3.50	3.40	3.40	3.30	3.25	3.15	3.05	2.95	2.85

fact stands out in connection with price declines and advances in 1921 in contrast to declines or advances in other years, and that is that with few exceptions either declines or advances were on the basis of $5 per ton, whereas formerly 50 cents, or at the most $1, represented the usual price change. By the middle of February, $4 and $5 per ton concessions were available. An effort was made to withdraw low quotations the latter part of March but early in April it became evident that even 3.00c, 4.00c and 5.00c were out of line and shortly thereafter 2.75c, 3.75c and 4.75c, respectively, on blue annealed, black and galvanized sheets became general.

On July 5 the Bethlehem Steel Co. announced a reduction of $4 per ton on blue annealed and $5 per ton on black and galvanized. Shortly thereafter the Steel corporation revised its prices accordingly. Then occurred cutting on stock sheets and some makers permitted certain customers to order production sheets at lower prices, as much as $5 or $10 under the leading interest's prices of 2.65c, 3.50c and 4.50c. The latter did not again change its prices until late in August when 2.25c, 2.75c and 3.75c became its minimum figures in competition to enable it to hold its customers. On Sept. 15 some of the independents increased these prices by $5 per ton. The leading interest, with some large independents, waited about a week to see if the higher prices would be maintained, when they again inaugurated the 2.50c, 3.00c and 4.00c levels.

One prominent valley producer announced that on Oct. 15 another $5 advance would be brought about on black and galvanized which had the effect of driving in some tonnage to mill books at the Sept. 15 levels. Blue annealed remained at 2.50c but black and galvanized went to 3.25c and 4.25c, respectively. This practically froze up the demand since a dearth of buying immediately became noticeable. Makers were not a unit in connection with the Oct. 15 advance and too many lower priced sheets were on the market for the 3.25c and 4.25c prices to remain long. The market again lost stability. Concessions soon were made by the interests who had been so aggressive in inaugurating increased prices, naming prices even that were $5 below the prices of Sept. 15.

Operations were more or less spasmodic all year. At its start the American company had 95 per cent of its sheet mills engaged, while independents were on a 25 or 35 per cent basis. While most of the improvement in sheet output was noted in the third quarter, a spurt was experienced in June when sheet producers started building up stocks.

Welded Pipe Demand Sustained in 1921

SUBJECTED to fewer interruptions in demand, welded-steel pipe remained comparatively steady during 1921, and in this respect stands out in contrast to other steel products. Tonnages moved were not commensurate with normal shipments and at times sales were so small compared with some orders of recent years that frequently makers did not consider they had a market at all. While welded pipe could not escape the effects of a curtailed steel demand, it is safe to say that mill operations were better perhaps than were those of any other finished line.

Practically 100 per cent operations were maintained throughout the first quarter but in April they were curtailed about 25 per cent. In May some producers dropped to 40 per cent while later in the second or at the beginning of the third quarter some got as low as 25 per cent. Third quarter operations were more or less spasmodic and real improvement did not come until October and November, when the general average increased to about 70 per cent. Operations were slightly better as the year closed.

Last year commenced with independent producers adopting the March 21 1919 discounts, or industrial board prices, which had been maintained by the National Tube Co. all during 1920. New cards were issued on April 13, July 7, and Sept. 21, all representing declines. The April 13 card increased classifications slightly, maintained the same discounts on some sizes and reduced prices on some grades $4 to $12 per ton. On April 8 a western maker had announced a reduction of $10 per ton but later brought its prices into line with the leading interest and other independent makers, and on April 13 all cards were alike. The July 7 card reduced prices further by $2 to $6 per ton while the last card issued, namely that of Sept. 16, registered further declines of $8 to $10 per ton.

Changes in Discounts of Standard Steel Pipe

Date	Sizes in inches	Butt Weld Basing Black	Butt Weld Discount Galv.
Jan. 1, 1910 to Oct. 1, 1910	⅛ to 6	78	68
Oct. 1, 1910 to Oct. 2, 1911	2 to 3	80	70
Oct. 2, 1911 to Dec. 1, 1911	2 to 3	81	74
Dec. 1, 1911 to Dec. 15, 1911	2 to 3	83	76
Dec. 15, 1911 to Jan. 1, 1912	2 to 3	83	76
Jan. 1, 1912 to July 1, 1912	2 to 3	82	75
July 1, 1912 to July 24, 1912	2 to 3	82	75
July 24, 1912 to Sept. 10, 1912	2 to 3	81	74
Sept. 10, 1912 to Jan. 1, 1913	2 to 3	80	72
Jan. 1, 1913 to Apr. 12, 1913	⅛ to 3	80	71½
Apr. 12, 1913 to May 27, 1913	⅛ to 3	79½	71
May 27, 1913 to Aug. 8, 1913	⅛ to 3	79	70½
Aug. 8, 1913 to Oct. 27, 1913	⅛ to 3	80	71½
Oct. 27, 1913 to Feb. 2, 1914	⅛ to 3	80	71½
Feb. 2, 1914 to Apr. 20, 1914	⅛ to 3	79½	71
Apr. 20, 1914 to Nov. 2, 1914	⅛ to 3	80	71½
Nov. 2, 1914 to Feb. 11, 1915	⅛ to 3	82	72½
Feb. 11, 1915 to May 1, 1915	⅛ to 3	80	69½
May 1, 1915 to June 1, 1915	⅛ to 3	79	68½
June 1, 1915 to June 17, 1915	⅛ to 3	79	63½
June 17, 1915 to Aug. 15, 1915	⅛ to 3	79	57½
Aug. 15, 1915 to Nov. 1, 1915	⅛ to 3	79	63½
Nov. 1, 1915 to Jan. 4, 1916	⅛ to 3	78	63½
Jan. 4, 1916 to Jan. 20, 1916	⅛ to 3	77	62½
Jan. 20, 1916 to Feb. 15, 1916	⅛ to 3	76	60½
Feb. 15, 1916 to Feb. 29, 1916	⅛ to 3	75	59½
Feb. 29, 1916 to Mar. 15, 1916	⅛ to 3	74	57½
Mar. 15, 1916 to Mar. 29, 1916	⅛ to 3	73	55½
Mar. 29, 1916 to Apr. 21, 1916	⅛ to 3	72	53½
Apr. 21, 1916 to July 24, 1916	⅛ to 3	70	50½
July 24, 1916 to Sept. 7, 1916	⅛ to 3	70	55½
Sept. 7, 1916 to Nov. 1, 1916	⅛ to 3	69	55½
Nov. 1, 1916 to Nov. 15, 1916	⅛ to 3	69	55½
Nov. 15, 1916 to Dec. 4, 1916	⅛ to 3	68	54½
Dec. 4, 1916 to Dec. 30, 1916	⅛ to 3	66	52½
Dec. 30, 1916 to Feb. 14, 1917	⅛ to 3	64	56½
Feb. 14, 1917 to Mar. 5, 1917	⅛ to 3	62	48½
Mar. 5, 1917 to Apr. 2, 1917	⅛ to 3	60	46½
Apr. 2, 1917 to Nov. 6, 1917	⅛ to 3	55	41½
Nov. 6, 1917 to Jan. 1, 1919	⅛ to 3	51	37½
Jan. 1, 1919 to Mar. 21, 1919	⅛ to 3	54	40½
*Mar. 21, 1919 to Apr. 13, 1921	⅛ to 3	57½	44
Apr. 13, 1921 to July 7, 1921	1 to 3	62½	50
July 7, 1921 to Sept. 16, 1921	1 to 3	64½	52
Sept. 16, 1921 to Dec. 15, 1921	1 to 3	68½	56
Dec. 15, 1921 to date	1 to 3	71	58½

* Level adopted by independent companies Dec. 31, 1920.

Metals Recover from 1921 Loss

After Year of Depression in Prices, Output and Consumption, Copper and Zinc Turn Rapidly Toward Normal—Sales Cover Tremendous War Surplus—Lead Has Fair Year—Tin Jumps with Exchange

GRADUAL recovery from the worst depression in their history is the record of most of the important nonferrous metals in 1921. In the autumn of 1920, the business slump began to involve the metal industries; by January, 1921, the depression was general. Producers and consumers of copper, zinc, tin, lead and other metals had large stocks in various forms. Prices declined to sacrifice levels and mines, smelters and mills began to close.

Thus, gradually, the statistical positions of various metals began to improve. By August, expanding general business facilitated this statistical correction. Large tonnages of copper and zinc contained in war scrap were absorbed during the year, in addition to much of the surplus stocks of new metals.

The copper situation was most acute early in 1921. Producers started the year with more than a billion pounds of copper above ground, in addition to the stocks of copper and scrap held by consumers. Their mines were producing at a rate of more than 100,000,000 pounds monthly and stocks were on the increase. Through the Copper Export association the producers arranged a loan from banks of $40,000,000 giving as collateral 400,000,000 pounds of copper.

This relieved the situation only temporarily. Then production was curtailed drastically. Practically all the important copper mining properties in this country were closed. Production was cut to about 20,000,000 pounds in this country from above 100,000,000 pounds monthly. South American output was curtailed.

The statistical situation was so improved by December that resumption by some mines early in the year was expected, to avert a possible runaway market. The course of the market for electrolytic copper during the year followed closely the trend of the statistical position. In August, when the corner turned, copper sold a shade below 11.37½c, delivered Connecticut valley, which excepting for a brief period in 1914, was the lowest price in this country since 1902. From that time forward the market improved, until by December the price was close to 14c, for January delivery. Germany was this country's best foreign copper customer taking 184,739,354 pounds the first 10 months out of total exports of 468,215,221, despite the demoralization of German exchange.

The zinc situation closely resembled the copper market. As the year began stocks of slab zinc amounted nearly to 70,000 tons and these were gradually augmented until by Aug. 1 stocks were over 90,000 tons. Meanwhile smelter production had been steadily cut, until the reduction overtook the decrease in consumption and by Dec. 1 stocks had been reduced to 67,049 tons, nearly 25,000 tons decrease in three months. The industry had been geared to produce enough for domestic requirements and to export some 100,000 tons annually. In 1920 exports of slabs and rolled zinc were 114,000 net tons. The 1920 break in sterling exchange cut off the export trade and in the first 10 months of 1921 total exports were about 3400 tons. Prices declined during the year to 4.10c, East St. Louis, the lowest price, with the exception of a short period in 1907, since 1902 and comparing with a 20-year average of about 6.75c. The improved demand for galvanized sheets began to be felt by the sheet steel mills by August, 1920.

The lead industry operated at a relatively better rate than other metal industries, due principally to the good paint business. Lead production was maintained at the rate of 60 per cent of normal and prices were fairly stable throughout most of the year. Early in 1921, lead consumption in Europe being flat, large exports from there and Mexico, aggregating over 55,000 tons, were made to the United States. This supply was absorbed here and as later in the year European consumption began to revive, European lead supplies were insufficient. London prices rose and that market became much more attractive to Mexican lead than the American market, causing a firm situation here. In December lead was held at 4.70c, New York, by the leading interest, with outside sellers, asking 4.80c, for brands used by pigment makers. European buyers were expected in the New York market.

The tin industry of the world was demoralized throughout most of the year, consumers having large stocks, especially the large tin plate mills in this country. Prices sagged gradually, from 34.00c as the year opened to 25.00c by mid-year, which was the lowest price in nearly 20 years. Gradually world production was curtailed, Bolivian and Chinese output being checked by the low London market.

The aluminum market was extremely quiet most of the year, due to the slump in the automobile industry, which is estimated to use 60 per cent of the output of this metal. The leading interest quoted 32.75c on 98 to 99 per cent virgin ingot as the year began, but in the last half year made two reductions of 5.00c to 6.00c each, bringing its price to 19.00c on this grade, almost in line with quotations on foreign brands.

Merging of the Anaconda Copper Mining and American Brass companies, which it appeared would be effected, was one of the outstanding features of the year in metals, for this is the first time that the industry has had a completely integrated concern on a scale large enough to mean anything. One organization now will carry through from the mineral in the mine to finished factory products.

Average Monthly Nonferrous Prices in 1921

Prompt, wholesale lots, cents per pound

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec. to 19th
Tin, spot, Straits New York.....	35.99	32.17	28.72	30.32	32.50	29.46	27.59	26.30	26.67	27.73	28.99	32.00
Electrolytic copper delivered..	13.15	13.00	12.43	12.77	13.05	13.01	12.56	11.91	12.21	12.95	13.31	13.80
Lead, New York, outside	4.91	4.49	4.24	4.50	5.01	4.48	4.46	4.38	4.61	4.71	4.69	4.70
Zinc, prime western, New York	5.43	4.93	4.73	4.74	4.86	4.43	4.26	4.18	4.24	4.60	4.68	4.85
Aluminum, outside 98-99.....	22.72	25.10	23.27	24.20	24.15	22.37	22.18	21.15	19.80	18.30	17.50	17.50
Antimony, spot.	5.21	5.23	5.21	5.16	5.30	5.05	4.69	4.52	4.51	4.89	4.62	4.50

Aluminum, by domestic producer, cut during year from 28.50c to 20c, ingot 99 per cent, with 98-99 per cent now 19c to 19.20c. St. Louis lead outside ⅛ to 1/3 cent under New York. A. S. & R. average usually nearly same as outside New York.

Scrap Market Erratic in 1921

Price Trend Generally Downward as Dealers Patiently Wait for Upward Turn—Consumers Take Little but Yards Pile Tonnages on Speculation—Considerable Distress Tonnage Absorbed—Production Also at Lower Rate

CONTRADICTIONS marked the course of the iron and steel scrap market during 1921. Liquidated in 1920 to a far greater degree than other departments of iron and steel, the scrap market started the year ready for action and throughout the year it was in a waiting attitude, hopeful, expectant, reacting to the slightest encouragement and possessed of a buoyancy seemingly little justified by the conditions.

Always sensitive to conditions before they affect other commodities, scrap has been swayed by a multitude of considerations which seemed to promise a change, for the most part disappointing. Yet, until the end of the year the expectation of better things was a constant will o' the wisp that eluded the grasp.

Market Scraped Bottom

Unlike the almost steadily downward course of new material, scrap presents a quotation curve made up of a decline and partial recovery. While mill and furnace products had only started on their liquidation during the preceding year, scrap had gone far by the beginning of 1921 and was the cheapest material in the industry. However, lack of demand further whittled the general level down $3 to $8 per ton, an average of close to $5 per ton, the low point being reached in July. From then to the end of the year there was a gradual recovery of much of this decline in almost all grades.

That this market was scraping bottom most of the time was proved by its instant rebound whenever anything like a buying movement appeared. This was repeated again and again and each time it seemed perhaps the turning point had been reached. Always there was a reaction, though not always to the former level.

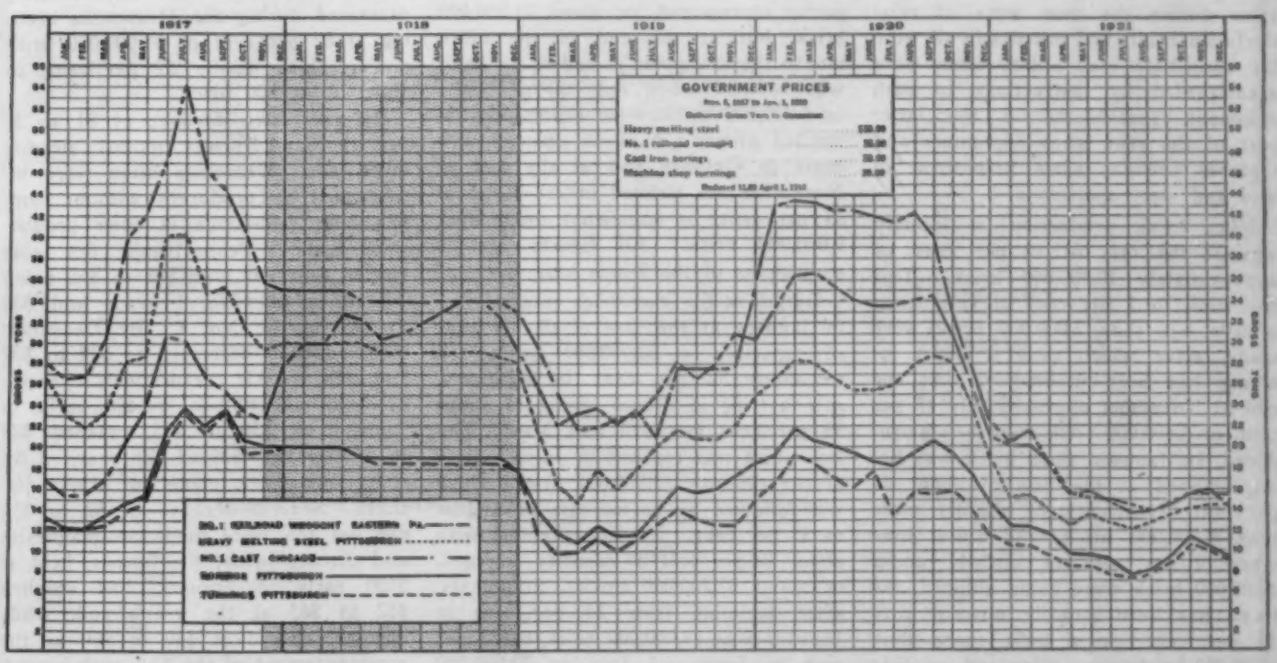
That dealers had an abiding faith in the approach of active buying at all times was evident through the year. It produced some peculiar contradictions. The most noticeable was in the third quarter when dealers paid railroads a higher price than ruled in the market, the buying price being higher than the selling. Such tonnages were applied in some cases on old contracts which allowed a profit but in others dealers relied on the delivery being deferred enough to bring the cars to hand after the expected advance. When the latter did not materialize, losses were met by those not able to take it into yards. Much of this sort of speculation was prevalent and considerable losses resulted.

Consumers who were in close touch with the situation had standing offers for tonnages of certain grades at prices always somewhat under the general level and absorbed much of this distress tonnage, obtaining their supply always under the market. At the low point scrap was cheaper than iron ore and it seemed a profitable investment to absorb tonnages as they were offered, especially for mills, which needed to handle them only once. For yards where they must be unloaded and later reloaded for shipment, this was not as economical, but large stocks were accumulated in this way and are being held for the better levels the dealers still believe are in store.

Consumers Not Interested

Among the unusual features was a period just before midyear when dealers found an unprecedented condition in which consumers could not be interested in scrap at any price. Cheapness seemed to be no temptation. For a time borings and turnings scarcely could be moved because handling and transportation charges totaled more than the value of the material itself.

With all lines of industry operating at a low point, much less industrial scrap was produced than usual, partly balancing the lowered consumptive demand. But railroads did much work in repairing rolling stock and rehabilitating their tracks and this produced a fairly large tonnage, more than consumers could



AVERAGE MONTHLY SCRAP PRICES 1917-1921. SHADED PORTION SHOWS PERIOD OF GOVERNMENT CONTROL

absorb. This was a load on the market and assisted in depressing prices.

Of scrap stored in yards early in the year little was moved as its owners could not realize its cost and handling charges and are awaiting the better market they believe is just ahead. The tonnage thus held is considerable, but apparently is not a burden on the market and with resumption of activities by consumers it is believed it will be absorbed before the scrap from new industrial operations begins to come out in volume.

With higher freight charges than formerly the movement of scrap to consuming centers has been made more difficult, as costs are much greater and freedom of movement is hampered.

The year in retrospect seems to have been a succession of artificial conditions, where speculative buying by dealers has been succeeded by periods of depression, with a constant optimism never realized and a movement of scrap only a fraction of that usually handled. Yet at the end of the year the industry seems in good condition and ready for the better things which must come when the present improvement in general business has gained momentum. To the prosperous years preceding the lean period is attributed the ability of dealers to weather the trying months of 1921. The real story of the market is found in the tabulated quotations on various grades at several principal market centers.

The average monthly prices on heavy melting steel at Pittsburgh, Chicago and eastern Pennsylvania during 1921 were as follows:

HEAVY MELTING STEEL

	Pittsburgh	Chicago	East Pa.
January	15.00	15.15	15.30
February	15.30	15.25	14.00
March	13.80	12.55	13.00
April	12.35	11.25	11.80
May	13.35	11.50	11.50
June	12.60	11.10	11.70
July	12.00	10.30	11.00
August	12.65	10.60	11.50
September	13.20	11.25	11.50
October	14.00	12.50	11.90
November	14.25	12.35	12.20
December	14.25	11.00	12.00

The average monthly prices on No. 1 cast scrap at Pittsburgh, Chicago and eastern Pennsylvania during 1921 were as follows:

NO. 1 RAILROAD WROUGHT

	Pittsburgh	Chicago	East Pa.
January	16.00	15.50	20.00
February	16.00	16.00	20.00
March	16.00	13.70	18.20
April	13.25	12.00	15.50
May	12.00	12.00	15.00
June	12.00	10.80	15.00
July	11.00	10.00	14.25
August	10.00	11.55	14.00
September	11.20	12.95	14.20
October	13.00	14.60	15.40
November	12.80	13.90	16.00
December	12.25	12.00	15.75

The average monthly prices on No. 1 railroad wrought at Pittsburgh, Chicago and eastern Pennsylvania during 1921 were as follows:

NO. 1 CAST

	Pittsburgh	Chicago	East Pa.
January	24.00	20.35	24.15
February	23.35	21.15	23.35
March	21.20	18.10	20.50
April	18.25	15.25	18.15
May	17.50	15.85	17.90
June	16.00	14.90	17.50
July	15.00	13.75	17.50
August	14.90	13.95	16.50
September	16.50	14.50	16.50
October	17.50	15.25	17.50
November	17.50	15.50	18.00
December	16.25	14.00	17.50

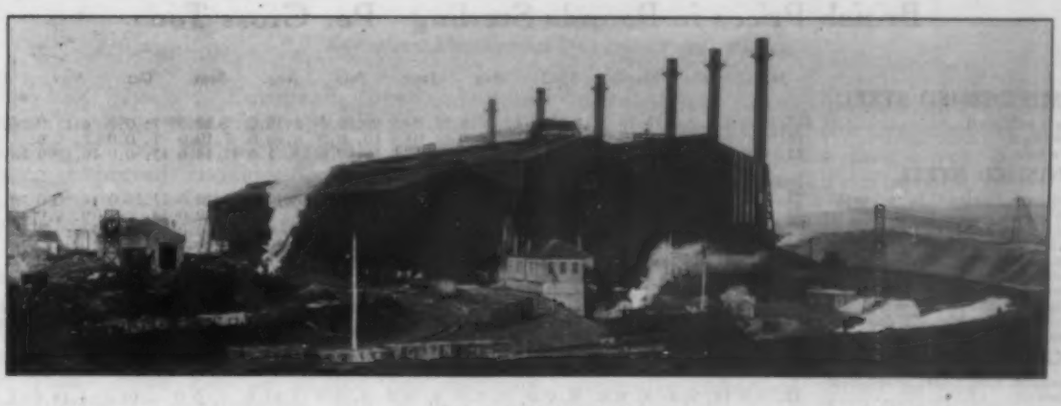
Demand for Refractories Follows Steel

DEPENDENT on the iron and steel industry for its chief demand, conditions in the refractories industry in 1921 could not do otherwise than reflect the general quietness which prevailed in that field. Because users maintained low stocks, the refractories industry responded to any slight change in iron and steel circles for better or for worse more readily than in other years. Most sales during the year were of relatively small lots and practically all were for immediate use; orders often were accompanied by instructions to rush shipment, particularly in the latter part of the year when September and October brought some betterment in iron and steel operations.

Silica brick production in January was at the rate of 40 per cent, or approximately 10,800,000 brick. This had sunk to 7 per cent in July when a little less than 2,000,000 brick were made, since which time a slight increase has been maintained. At the end of November approximately 17 per cent, or 4,500,000 brick were being produced. In January silica brick was being shipped at the rate of about 30 per cent of capacity, or slightly more than 8,000,000 brick, and since June when 9 per cent or slightly under 2,500,000 brick were being shipped, the trend has been steadily upward until 19 per cent, or a trifle more than 5,000,000 brick were going out monthly in November. Stocks on hand when 1921 started amounted to approximately 135 per cent of capacity or 37,000,000 brick and while the high point was reached in March when 165 per cent of capacity was stocked with slightly less than 45,000,000 brick, this had been decreased by November to 152 per cent or about 41,000,000 brick. From January to September the drop in unfilled orders was unchecked. The year started with 76 per cent of capacity represented, or about 21,000,000 brick, but at the end of the ninth month the low point in orders on hand was reached when only 30 per cent, or 8,279,000 brick were represented in unfilled orders. A slight upward turn came in October and at the end of November the unfilled orders stood at 33 per cent, or somewhat more than 9,000,000 brick. All figures are in equivalents of the 9-inch base size.

Output of fire clay brick commencing in January at the rate of 67 per cent of capacity, or 53,000,000 brick, fell to about 52 per cent in February, rose a trifle in March, going to about 33 per cent in April and May. The low point was reached in July, namely 27 per cent, or 23,000,000 brick, which was followed by an increase in August to 35 per cent. November ended with about 40 per cent of capacity engaged, or about 37,700,000 brick. Shipments, after declining from 55 per cent in January was 44,000,000 brick to 27 per cent in June and July or 22,000,000 brick have shown a consistent trend upward to 40 per cent at the end of October although November saw a slight falling off of about 4 per cent, or 29,000,000 brick. Stocks estimated at 146 per cent of the average monthly producing capacity of six normal months, or about 117,000,000 brick, at the year's start, increased to around 180 per cent at the close, or approximately 142,000,000 brick. Unfilled orders on the other hand have steadily decreased during the 11 months starting at 87 per cent or 69,000,000 brick and reaching finally 32 per cent, or about 25,000,000 brick.

By successive declines of $1 to $5 per thousand, prices moved steadily downward. Decreases often were inaugurated by producers without compensating reductions in their production costs. Pennsylvania fire clay started the year with $45 to $55 being quoted on the No. 1 grade and $35 to $45 on the No. 2. By December this had been decreased to $32 to $37 and $28 to $32, respectively. Pennsylvania silica brick, quoted early in January at $50 to $55, reached $28 to $30 by the end of the year. Like reductions were made in other districts. Several declines of $2 to $10 per net ton were made on magnesite and chrome brick; the former, held at $100 early in January, had reached $52 to $55 at the year's end, while chrome, quoted at $80 to $90 at the commencement of the 12-month period, was being quoted at $43 to $45.



European Rolling Mill

European Market Reviews For 1921

Reports by The Iron Trade Review
Staff Correspondents
Covering

Great Britain
France
Italy
Belgium
Czecho-Slovakia
Germany
Austria
Poland
Spain
Russia

Japan

European Iron and Steel Prices in 1921

British Prices in Pounds Sterling—Per Gross Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
SEMIFINISHED STEEL												
Billets soft steel	£15.10.0	14. 0.0	12.10.0	12.10.0	12.10.0	11.10 0	10. 0.0	8.10.0	7.10.0	7. 0.0	6.15.0	6.15.0
Sheet bars	16. 0.0	14.10.0	12.10.0	12.10.0	12.10.0	11.10.0	10. 0.0	8.10.0	7.10.0	7. 0.0	7. 0.0	7. 0.0
Wire rods	22. 0.0	16.15.0	16.15.0	15.10.0	15.10.0	15.10.0	15.10.0	13. 5.0	12.10.0	12. 0.0	10.10.0	10.10.0
FINISHED STEEL												
Steel bars, England, ½ to 3 inch	21. 0.0	17. 0.0	16. 0.0	15. 0.0	13.10.0	13. 0.0	12.17.6	12.10.0	11.10.0	11.10.0	10. 0.0	10. 0.0
Ship plates, England	22. 0.0	21.10.0	21. 0.0	19. 0.0	19. 0.0	19. 0.0	15. 0.0	15. 0.0	14. 0.0	14. 0.0	10. 0.0	10. 0.0
Ship plates, Scotland	22. 0.0	22. 0.0	21. 0.0	19. 0.0	19. 0.0	19. 0.0	15. 0.0	15. 0.0	14. 0.0	14. 0.0	12. 0.0	9.10.0
Beams, England	22. 0.0	21. 0.0	19. 0.0	17.10.0	17.10.0	17.10.0	14.10.0	14.10.0	13.10.0	13.10.0	10. 0.0	10. 0.0
Beams, Scotland	22. 0.0	21. 0.0	21. 0.0	17.10.0	17.10.0	17.10.0	14.10.0	14.10.0	13.10.0	13.10.0	12. 0.0	10. 0.0
Sheets, black, 24 gage	25. 0.0	23. 0.0	23. 0.0	21. 0.0	21. 0.0	18.10.0	18. 0.0	17.10.0	17. 0.0	14. 0.0	13. 0.0	12 15 0
Sheets, galvanized	29. 0.0	25. 0.0	24.10.0	24. 0.0	22. 0.0	22. 0.0	23. 0.0	22.10.0	21. 0.0	18.10.0	18. 0.0	17. 0.0
Rails, 60 pounds and over	25. 0.0	21. 0.0	18. 0.0	18. 0.0	15. 0.0	15. 0.0	15. 0.0	14. 0.0	14. 0.0	14. 0.0	9. 0.0	9. 0.0
Tinplates, base box, 108 pounds	1.14.0	1.12.0	1. 6.0	1. 6.0	1. 8.0	1. 6.0	1. 5.0	1. 5.0	1. 3.6	1. 1.0	1. 1.6	1. 1.0
Steel hoops	26.15.0	23. 0.0	20. 0.0	18.10.0	17. 0.0	16.10.0	15. 0.0	15. 0.0	14. 0.0	14. 0.0	13. 0.0	12. 5.0
PIG IRON												
Hematite, East Coast mixed numbers	12. 0.0	11. 0.0	9. 0.0	9. 0.0	9. 0.0	8. 0.0	8. 0.0	7.15.0	7. 0.0	6.10.0	5.18.6	5.10.0
Hematite, West Coast mixed numbers	13.10.0	12. 0.0	9. 0.0	9. 0.0	8. 0.0	8. 0.0	8. 0.0	8. 0.0	7.10.0	6.10.0	5.18.6	5.18.6
Middlesbrough basic	11. 5.0	9. 0.0	7. 0.0	6. 0.0	6. 0.0	6. 0.0	6. 0.0	6. 0.0	5.17.6	5.17.6	5.10.0	5.10.0
Middlesbrough, No. 3	10.15.0	9.15.0	7.10.0	6. 0.0	6.10.0	6.15.0	7. 0.0	6.17.6	6.15.0	6. 0.0	5.10.0	5. 0.0
No. 3 Foundry, Derby, Leicester and Nottingham	13. 0.0	11.10.0	9. 0.0	7.15.0	8. 0.0	9. 0.0	9. 0.0	8.15.0	7.10.0	6. 0.0	5. 2.6	4.17.6
No. 3 Foundry, Northampton	12. 0.0	11. 0.0	8.10.0	7. 5.0	7. 5.0	*	*	*	6.10.0	5.12.6	5. 2.6	4.17.6
No. 3 Foundry, Staffordshire	13. 7.6	11.10.0	9. 0.0	8.10.0	7.10.0	*	8.10.0	8. 5.0	7.10.0	7. 0.0	5.15.0	5. 0.0
No. 3, Scotch foundry	13.10.0	11.10.0	9. 0.0	8. 7.6	8. 5.0	8.12.6	9. 0.0	8.17.6	8. 7.6	8. 5.0	6. 7.6	6. 0.0
Ferromanganese, 76-80 per cent	32. 0.0	28. 0.0	22.10.0	22.10.0	20. 0.0	18. 0.0	18. 0.0	18. 0.0	18. 0.0	16. 0.0	15. 0.0	15. 0.0
COKE												
Furnace, Yorkshire	3. 5.9	2.15.0	2. 5.0	2. 5.0	2. 5.0	2. 5.0	3. 0.0	1.10.0	1. 2.6	1. 2.6	1. 0.0	1. 0.0
Foundry, Yorkshire	4. 5.0	3. 7.6	3. 0.0	3. 0.0	3. 0.0	3. 0.0	4.10.0	2. 5.0	1.10.0	1.10.0	1.10.0	1.10.0

* No quotations: stocks sold out account of coal strike

German Prices in Marks—Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
PIG IRON												
No. 3 Foundry	1659	1659	1509	1509	1484	1484	1484	1484	1484	1484	2124	3250
SEMIFINISHED STEEL												
Ingots	1770	1770	1770	1770	1350	1350	1250	1400	1770	2000	3300	3900
Billets	1995	1995	1995	1995	1500	1500	1425	1550	1995	2725	3700	4000
FINISHED STEEL												
Bars	2440	2440	2440	2440	1750	1800	1900	2000	2600	3200	4500	7200
Ship Plates	3090	3090	2700	3090	1800	1750	1700	1850	2100	2800	5600	6000
Thin plates	3360	3360	3360	3360	1900	1800	1800	1875	2700	3500	5900	7000
Black Sheets	3475	3475	3475	3475	2000	1900	1800	2400	3200	4000	6300	12000
Plain Wire	2720	2500	2300	2300	1700	1800	1800	2200	2700	3500	4900	6500
Bands and Strips	3350	3350	2930	2930	2300	2300	2000	2300	3300	4500	5000	9850
Wire Nails	4100	4100	3680	3680	2700	2700	....	....	4500	....	....	....
FUEL												
Furnace Coke	289	289	289	331	331	331	331	331	370	370	370	500
Ruhr Gas Coal	198	198	198	227	227	227	227	227	254	254	254	350

French Prices in Francs—Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Hematite pig iron, Lorraine	645	625	575	535	535	450	425	425	400	400	400	400
Foundry, Longwy, No. 3 sand-cast	400	347	347	255	230	240	195	195	180	165	175	175
Billets	745	745	600	550	550	420	320	300	280	315	340	360
Plates	1150	1150	1050	850	700	630	625	625	625	655	660	660
Shapes	900	900	750	750	550	475	420	480	475	475	475	475
Merchant bars	900	900	750	750	550	450	380	380	360	420	440	440
Furnace Coke	135	135	135	110	110	110	110	110	100	100	100	100

Belgian Prices in Francs—Per Metric Ton

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Basic bessemer pig iron	385	300	280	295	260	230	190	165	195	205	220	225
Foundry No. 3, Belgian	400	325	300	290	280	235	200	200	225	235	235	240
Foundry No. 3, Luxemburg	450	400	340	300	290	225	180	140	205	200	200	225
Billets	515	415	395	335	340	320	320	265	330	365	385	385
Plates	800	800	625	610	605	525	460	480	480	480	490	500
Shapes	650	555	475	465	460	420	390	370	410	425	435	435
Merchant bars	625	600	475	450	440	400	390	390	410	430	445	450

New Year Brings Hope to Europe

Prices Tend Toward Business Basis—Transportation Chaos Ended—Coal Shortage Eliminated—Labor in a Better Mood—Germany and Austria Still Inflating—Russia Slowly Awakening

BY H. COLE ESTEP
European Manager of The Iron Trade Review

VIEWED broadly, European iron and steel seems to have come through the critical conditions of 1921 in better shape than might have been expected considering the utter chaos which existed everywhere except in Great Britain and the neutral countries at the close of the war. There have been relatively few financial failures, and business is more active than in midsummer. Although there are many rough spots to be traveled in 1922, European iron and steel producers in general are able to view the future with confidence. It is three years since Europe shifted her energies from destruction to construction, and in that time a large amount of solid work has been done the beneficial effects of which should become increasingly evident as times goes on. In the United States it still seems to be the fashion in some quarters to adopt the "view with alarm" attitude toward European business conditions. This attitude does not seem to be wholly justified.

From the Atlantic ocean to the Russian border, the transportation chaos of early 1920 has been eradicated and both freight and passengers now move with reasonable promptness and precision. This is a fundamental factor of great importance. Fuel supplies instead of being miserably short are adequate. Labor, which was on a rampage in 1920 that culminated finally in the British coal and Belgian steel strikes, is now generally in a much more reasonable frame of mind. The daily productive efficiency of the European laborer is about 50 per cent better than during the post-armistice boom period. As the chart at the bottom of this page shows prices of iron and steel are tending toward equilibrium; the irregularities are much less marked than was the case a year ago. Finally as reflecting the generally improved situation, in spite of the disappointing business returns in the year just closed, the gold value of most European currencies, except the former Central Empires, increased in 1921. This movement was led by the British pound which gained 20 per cent in gold value. French, Belgian and Italian currencies appreciated in about the same measure, reflecting a generally enhanced ability to pay. Europe gained in real wealth in 1921.

So far as the prospects of business development are concerned most of the danger signals now displayed will be found flying east of the Rhine. Germany is pleading for a moratorium on reparations and Austrian finance is in chaos. Central European business is active but tends to be unhealthy; while the western nations have been deflating the defeated countries have gone on inflating. Yet Central Europe is the only part of the Old World which improved its iron and steel output over 1920. But even from this standpoint Germany leaves something to be desired, since her output is considerably below the capacity of her mills and furnaces. Due to the reparations debt, there is a condition of activity without the increase in real wealth usually associated with such activity. Further east in Russia the clouds are lifting a little. So on the whole Europe has reason to look forward to considerably improved business during 1922.

A COMPARISON OF PRICES OF PIG IRON, BILLETS AND BARS AT THE END OF 1921

Britain Liquidates for New Start

Prices, Wages, Costs All Come Down with a Rush—Production and Exports Show Heavy Increase since Midyear—High Railroad Rates Preventing Progress—Foreign Steel Imports Checked

BY JOSEPH HORTON
British Correspondent of The Iron Trade Review

THE year 1921 will long be memorable for its debacle in prices, wages and profits. British industry has passed through a severe testing, reproducing in the industrial sphere the tremendous experiences of the war. Yet the foundations remain sound, and the prevailing confidence is undoubtedly based to some extent on the steadiness with which unparalleled shocks have been endured. It is remarkable that financial failures have been fewer than in any previous depression, and quite insignificant either in number or importance. Nearly everybody now believes that the worst is past.

The foreign trade statistics which are given on the following page require careful examination and are most valuable to enable comparisons to be made covering the months succeeding the coal strike, showing clearly the steady growth in overseas business, and in particular, the remarkable recovery in the galvanized sheet and tin plate trade. A very important change for the better is apparent in the coal exports which totaled 3,405,972 tons in October and are not now far below those of 1913, while values are getting very close to the business basis, recent dealings having been at rates being about £1 4s ($4.80) per ton. Americans will have noticed that the prices of British galvanized sheets and tin plate have for some time been lower than those quoted in the United States. The British exchange during the past six months has also shown a steady recovery, while many other European exchanges led by the German mark have gone down in value, a circumstance which shows that British credit in the world's estimation is recovering its old position.

Production Slowly Increasing

There is a steady improvement in pig iron production as well as in the output of steel, while the exclusion of foreign steel demonstrates that British steelmakers have once more appeared in the international arena on competitive terms. Add to this the fact that wages as well as the cost of living have fallen rapidly, and it will be seen that a condition of equilibrium is approaching which will facilitate a fresh start toward solid prosperity throughout the coming year.

One or two formidable difficulties have yet to be overcome before the iron and steel trade can say with confidence that the jumping-off place from which the race is to commence toward the next boom, has been reached. The first and most important is the adjustment of railway rates. Before the war ore brought to a Staffordshire furnace from Northampton cost 2s 10d per ton. Until the beginning of November the carriage was 6s 2d. Now it is 5s 3d, but still 87 per cent above the prewar figure. Limestone is 5s 9d per ton as against 3s 4d and still 73 per cent above prewar rates. No concession whatever has been obtained on the carriage of coal and coke, or for the transport of pig iron, with the result that in some cases freight charges may come to about £3 per ton on a product which at present market values has to be sold for about £5. The railways are now being attacked on all sides by iron and steel trade organizations, with a view to compelling a more reasonable attitude, and there is no doubt that in their own interests the railways will shortly make drastic reductions in their carriage charges.

Through the National Federation of Iron and Steel Manufacturers the interesting fact is brought out that the wages of workers in the iron and steel industry were reduced in the first nine months of the year by £1 7s 6d ($5.50) per week, which is more than the cuts sustained by any class of workers. The trade is now finding the advantage of its wages board and sliding scale system which has effected these sweeping though necessary reductions, without any interruption of work, and practically without friction in any part of the country. Fuel charges it is pointed out, have also come down, until in the districts, they are only 60 per cent above those of prewar. With regard to prices, the federation states:

"That manufacturers are doing all they can is shown by the fact that the present price of typical iron and steel products is considerably less than half the maximum price ruling toward the end of last year, and in most cases, no more than 30 per cent to 60 per cent above the average price of 1913."

As examples of this, the federation quotes the reduction of prices of typical products from the maximum as follows: Cleveland No. 3 pig iron from £11 5s to £5 10s; rails from £25 to £9; ship plates £24 10s to £10; tin plates £3 18s per box to £1 2s; beams from £24 to £10; angles from £25 to £10. To this list may be added galvanized sheets, which have fallen from £29 to £17 10s during the present year, and billets from £15 to £6 15s, while furnace coke, which in January was £3 5s 9d is now £1.

Pig Iron Makes Slow Recovery

The latest statistics of pig iron and steel production in October, while in some respects they are disquieting, emphasize clearly the conditions essential to trade recovery, and taken in conjunction with the overseas statistics, are helpful to an intelligent forecast of the future. Pig iron production has made a slow recovery from 10,000 tons in July, to 235,000 tons in October. Steel which at the end of the strike leaped at once from 2000 tons in June to 117,000 in July and progressed to 434,000 in August, came down in October to 405,000 tons.

The slow starting of blast furnaces, putting in operation only 82 by the end of October, as against 300 in September last year emphasizes the need for cheaper fuel and lower railway rates. But these figures should be taken in connection with the records of pig iron imports during the autumn, which in September exceeded 120,000 tons. Those figures show an increasing demand for pig iron, which English smelters have no doubt of their ability to meet very shortly, by means of cheaper fuel and lower railway rates. It will be observed that the exports of pig iron are making decided progress, and this important trade also may be depended upon to show recovery during the coming year.

The position in regard to steel is rather baffling, particularly when the remarkable contrast between the various districts are taken into account. While South Wales in October reached 86 per cent of its average monthly production last year; Lincolnshire only touched 22 per cent; Scotland 27 per cent; the northeast coast 56 per cent; Sheffield

district 43 per cent; and the west coast, 60 per cent.

These irregularities are probably without precedent. But they are explicable to students of recent British conditions. South Wales, on the one hand, has its steel works nearly all in the hands of great syndicates, having command of every item of raw material, and controlling every development from the mining of the ore to the shipment of the finished article. The poor showing of Scotland with the only 27 per cent of its 1920 average of production is perhaps the most disquieting feature of the situation since it reflects the severity of the slump in shipbuilding a condition which unfortunately shows no sign of mending. Ship values have decreased heavily while the cost of building has not come down in proportion, so that any revival of shipbuilding in the early months of the year is hardly to be looked for.

A New Labor Attitude

Among the encouraging signs is a saner spirit manifest among the working classes. In fairness to the iron and steel workers, it should be said that they have not been responsible for the labor difficulties of the year. Yet in August they sustained a reduction of no less than 80 per cent in one cut, the third fairly substantial reduction from the large addition to prewar wages. Wages are still around 90 per cent above 1914. Iron ore miners have accepted reductions of 7s 6d ($1.50) a day. The pacific and reasonable disposition of the iron and steel workers naturally increased their irritation at the long period of idleness inflicted upon them by the coal strike, for which they were in no way responsible. Iron workers have also been keen in advocating the establishment of a fund mutually contributed to by employes and workmen, which would render the industry independent in times of slackness of the government's unemployment insurance, a system which is not at all unlikely to come into operation when the times are favorable for its establishment.

Little need be said about the coal strike, which was an unmitigated misfortune, administering a knockdown blow at a time when the industry was already, so to speak, reeling under uneconomic conditions, and coping with great difficulties. It is quite true that a number of blast furnaces had already blown out before the strike began, but the stoppage accelerated the downward movement. It inflicted serious losses upon the holders of pig iron and billet stocks, which deterioriated enormously in value at a time when it was impossible to lessen those losses by a steady consumption of the material. There are engineering and other firms still holding quantities of pig iron bought before the outbreak of the coal strike. A better spirit in labor generally, with a greater willingness to work and a better recognition of economic facts is undoubtedly a most cheering circumstance, although it is to be regretted that so many otherwise intelligent workmen refused to appreciate facts until they were forced upon them in the bitter school of experience.

Tariff Protects Industries

A matter of some economic importance was the adoption in the early summer of the safeguarding of industries act enabling a tariff of 33 1/3 per cent to be imposed against imports sent into the country under dumping conditions likely to aggravate unemployment. The act, however is hampered by conditions which make it difficult, and on the whole unlikely of application. An essential to its operation is a certain amount of unanimity in support of the demand for a tariff, and in view of the conflicting interests existing in various branches of the trade, it is not very likely that

British Foreign Trade in Iron and Steel

Exports in Gross Tons for 1921

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.
Pig iron and ferroalloys	20,086	14,015	9,011	11,048	11,074	12,552	10,118	5,092	6,941	9,472
Blooms, billets, slabs, other than of special steel	126	85	22	197	219	2	2	42	209	429
Bars	17,362	13,642	9,001	10,592	4,851	2,115	2,702	4,074	9,805	10,711
Beams, etc.	7,348	3,944	4,155	5,399	1,961	1,126	2,082	2,557	3,093	2,949
Hoops and strips	3,640	2,684	1,354	1,069	825	203	291	901	3,635	2,463
Plates and sheets not under ⅛ inch	26,318	23,060	24,844	13,949	5,607	1,336	2,680	6,174	6,016	7,544
Sheets under ⅛-inch, other than black plates	5,625	4,334	6,299	5,226	3,078	684	779	1,093	3,729	3,758
Galvanized sheets	19,774	8,017	6,497	9,659	10,679	4,471	2,691	10,153	21,670	32,222
Tin plates	33,822	21,518	16,076	13,667	12,350	8,801	8,827	8,787	19,792	25,356
Cast iron pipe	7,034	7,292	5,674	6,744	3,950	4,010	3,440	2,313	4,465	4,443
Steel pipe	11,951	8,190	8,502	10,450	6,647	2,429	3,742	3,186	5,551	5,012
Steel rails, new	21,161	15,934	11,349	25,124	10,622	1,282	1,587	5,458	20,199	15,798
Wire	5,021	2,542	1,948	1,653	690	1,034	379	1,110	987	1,709
Wire products	2,538	1,968	1,959	1,881	1,575	1,014	1,459	2,364	520	1,578
Manufactures of cast iron	2,309	1,761	1,942	2,248	1,118	669	1,705	1,097	1,082	1,107
Anchors, grapnels, chains, etc.	2,125	1,365	2,070	1,786	1,244	853	473	686	1,014	1,240
Hollow-ware	1,660	945	887	879	549	508	502	437	564	667
Miscellaneous iron and steel	12,648	12,207	12,340	13,864	10,134	12,069	11,252	8,751	6,919	8,862
Total including items not specified above	232,380	166,869	148,852	160,133	99,014	64,701	64,001	76,461	133,324	155,848

Imports in Gross Tons for 1921

Pig iron:	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.
Forge and foundry	16,898	29,976	38,085	24,830	15,713	19,369	30,308	43,643	72,959	52,991
Bessemer	2,021	1,000	1,025	....	2,000	....	....	30	2,382	240
Basic	20,521	11,508	14,394	9,736	1,821	3,670	2,646	20,058	45,488	40,898
Ferroalloys	375	252	636	386	107	11	314	501	905	1,762
Blooms, billets, slabs	26,257	20,385	15,637	7,685	6,163	11,517	10,480	15,296	19,902	17,223
Iron bars and rods	15,533	16,060	18,031	10,562	6,607	7,498	9,020	9,289	10,326	8,703
Sheet and tin bars	6,132	12,043	7,340	3,004	8,190	4,151	10,537	10,404	11,750	10,287
Wire rods	4,600	1,375	1,291	1,255	987	1,628	2,686	2,369	2,399	3,050
Steel bars, rods, angles	11,363	11,190	10,405	6,844	3,979	4,963	6,928	6,326	8,213	6,456
Girders, beams, etc.	3,075	2,794	3,674	3,528	2,577	2,143	3,567	3,843	2,439	3,904
Hoops	978	618	678	359	95	363	285	475	589	480
Skelp	1,516	2,297	1,416	2,099	5,066	639	1,005	1,169	831	3,683
Special plates	1,044	1,019	983	471	370	737	687	614	574	591
Other plates and sheets not under ⅛-inch	15,649	20,660	15,843	9,275	4,481	6,965	5,300	5,477	5,366	4,631
Steel rails, grooved	2,105	2,066	3,112	1,957	6,551	4,082	604	....	286	283
Railway rails	1,020	1,723	1,432	1,786	1,837	1,829	3,620	2,031	3,928	2,085
Wire products	5,692	2,570	2,334	1,908	1,411	2,375	3,138	3,823	3,677	....
Steel pipe	5,138	1,674	2,372	3,945	1,787	1,425	1,052	2,450	1,680	....
Wire	3,661	2,867	2,779	1,672	1,674	2,139	3,653	3,891	2,961	....
Total including items not specified	157,843	154,962	156,088	103,010	82,389	84,517	103,698	141,654	206,839	174,967

any demand of this nature will be put forward.

It seems likely that the new year will see some weakening of the trade combinations, which, with a fair show of efficiency have regulated prices as between the different British districts. Now that competition has become keen, the best equipped works naturally desire to take advantage of their facilities for cheap production. The most important step in the ways of disintegration was that taken by Scotland early in November in deciding to fix its prices of certain descriptions of steel independently of steel associations south of the Tweed. The resulting keener competition is expected to have strong effect in the further depression of prices generally anticipated.

In spite of the discouraging position of affairs, large concerns in Sheffield and the North of England, as well as in Scotland are at the present time engaged on plant extensions, including the putting down of some powerful and up-to-date mills of large capacity. This is the more signicant as some of the finest plants built during the war have been idle during most of the year.

The Staffordshire wrought iron trade has had the worst experience during the past few months probably in the history of the trade. The fancy prices prevailing at the beginning of the year have long since disappeared. The marked bar, or best iron trade, has never been short of business, although its prices have been maintained out of proportion to those of ordinary iron. This industry is held by a handful of companies who specialize on high class material. Very tough and fibrous, having an unrivalled reputation for various naval purposes. and certain engineering requirements. The trade is handicapped to an appalling extent by the continuance of the 8-hour day, very strongly assailed by manufacturers, likely to become a bone of contention early in the new year. The iron trade is regulated by half a dozen wrought iron bar associations covering all districts, but its authority has lately been a good deal weakened by a lot of independent price fixing, and it seems unlikely that the combination can have much influence in view of the competitive conditions likely to prevail for some time to come.

As to the future demand for iron and steel, there seems every prospect that this must soon crystallize into orders in view of the need for railway repairs. The extreme scarcity of house property, and the general shortage of stocks. The signs all point to a new state of affairs in the way of iron and steel activity in the new year.

Strikes Reduce Production in Belgium

By a Special Correspondent

THE metallurgical situation of Belgium remains promising although the year under review has not been without strenuous difficulties, with regard both to production and its distribution. Wages have in general been reduced during the year by 5 per cent on three separate occasions and another 5 per cent reduction is imminent. Labor troubles seriously affected some of the bigger concerns in the Liege and Charleroi districts and in the case of Ougree-Marihaye a strike lasted from May to November.

The Belgian price scale is in almost every case less than that of France, though Lorraine and Saar competition in Belgium, on pig iron and semifinished products, has been such that Belgian steelmakers and rerollers have had the advantage of buying abroad on more favorable terms than at home. The table on a preceding page shows the course of prices.

The Luxemburg-Belgian agreement for reciprocity is a subject of controversy in the latter country. Luxemburg consumes only 2 per cent of its production of iron and steel. The rest goes abroad and by far the larger part of it out into the world through Belgium where much of it stops long enough to be rerolled or fabricated. For the moment this has been an advantage to Belgium, which sought to get this Luxemburg transit business for its canals, railways and ports and shipping. The fear is that it will affect the starting up of a Belgian revival on a large scale so soon as market conditions otherwise warrant. On the other hand it may be considered as an answer to possible future French competition as the Belgian-Luxemburg combination is contiguous to iron ore has more readily available coal and coke than the French industry, and their workers are not as keen on holding to the 8-hour day as those in France.

Germany Dumps Into Belgium

What is even more serious for Belgium is the growth of German dumping—at least the Belgians call it that. Of machinery alone Germany sold to Belgium during the first half year of 1921 to the extent of 100,000,000 francs while the same period of 1920 accounted for but 40,000,000 francs. To stop this, and to apply as well on semifinished steel products Belgium in November, decreed a new tariff against all German products offered for import at the frontier. Many items are charged a double duty, one ad valorem, and another specific.

As to labor there has already been noted an exodus into the French invaded regions. The Monceaux-Saint Fiacre and the Martinet mines in the Charleroi district immediately raised their wage scale to 14.51 francs a day in an effort to stop the outflow. This rate represents just one American dollar a day.

Briefly the end of the year summing up of Belgian metallurgy is as follows: There is a diminution of orders in hand due ot the still effective hold off policy awaiting further price adjustments—hardly likely to go further downward immediately. There is restraint on the part of producers awaiting foreign competitors' attitudes. Pig iron is firm in price and demand, with a tendency to increase production and stabilize prices. The drop in furnace coke in France offers some anxiety to Belgian blast furnaces as they are paying at this time some 20 francs more, that is 95 francs ($6.65) a ton. Blooms and billets arrived in Belgium from Lorraine until well up to the end of the year at 325 to 330 francs ($23.50 to $24.00), said to be from 15 to 30 francs less than they were offered French rerollers. Belgium, however, is essentially a transforming country, and its highly finished products represent the bulk of its prosperity.

Steel production in Belgium in September, 1921 amounted to 34,000 tons, compared with the average monthly production of 101,300 tons in 1920. The position of Belgium with respect to France is indicated by the fact that France's production of steel in September, 1921 amounted to 232,100 tons, compared with 250,000 tons average in 1920.

Only 11 blast furnaces were operating in Belgium in October, but the Thy-le Chateau and Ougree-Marihaye companies doubled their output in November, and as the year drew to a close operations of steel plants and furnaces increased.

Frenchmen Show Selling Ability

In Spite of Lower Prices and a Slow Demand Production Is Maintained and Foreign Trade Increased Over 1920—Exports are Twice Prewar Maximum—Flood of Imports Is Checked

BY FRANCIS MILTOUN
French Correspondent of The Iron Trade Review

ALONE among the nations west of the Rhine, France maintained her iron and steel production last year practically on the 1920 level. This represents an achievement of some moment, especially since French prices were really deflated, like those of the other principal producers outside the former Central powers. At the beginning of the year Longwy No. 3 foundry pig iron was $26.75 at current exchange, or 450 francs in French currency; at the end it was $12.70 or 175 francs. Other products moved down in a similar manner. So in maintaining her production France did not enjoy the artificial stimulus which existed in Germany. In spite of its many difficulties and disappointments since the end of the war, the French iron and steel industry seems to be in a strong position with hope for the future. This point of view is emphasized by comparison with neighboring Belgium, where underlying conditions are similar to those in France. Drawing her ore from virtually the same source, Belgium could not keep up her output last year and production dropped far below the 1920 level. The year 1921 was a test of commercial acumen, and from a general view of the position developed by the twelve months' events, French marketing ability would seem to be an established fact. France's iron and steel exports are now over double what they were before the war.

The French coal mines in the Nord district have reached 55 per cent of prewar capacity and those of the Pas-de-Calais 18 per cent. Coal production has steadily increased from 22,000,000 tons in 1919 to 34,700,000 tons in 1920, and will probably attain 37,600,000 tons in 1921. Importations of coal are at the rate of about 26,000,000 tons a year. Coke production barely reached 2,000,000 tons last year, of which approximately one half was due to the big self-contained plants affiliated with blast furnaces. Imports of coke last year reached to between 4,000,000 and 5,000,000 tons, of which three quarters was of German origin. French blast furnaces at the moment demand a minimum of 6,000,000 tons of coke a year for capacity operation with a maximum of 10,000,000 tons if reasonable production is to eventuate from the ore resources now available. German coke deliveries from the Ruhr came through more regularly than in 1920, and the "controled" price of 75 francs a ton for furnace coke in September brought about the slump in the price of pig iron, which resulted in 155 francs and 160 francs being quoted for No. 3 foundry iron for a short time which in spite of the lower price for coke, was manifestly less than could possibly show a producing profit. The proof of this was later shown in a rise to 175 francs where the figure stood in November. A government decree in mid-November allocating, prospectively, German furnace coke at 65 francs ($4.70) a ton brought no further immediate price reduction on pig iron.

French Foreign Trade

Monthly average:	Exports	Imports
1913	48	13
1919	19	113
1920	75	89
Last year—1921:		
January	89	44
February	126	35
March	123	34
April	117	26
May	97	31
June	109	20
July	88	30
August	123	16

In thousands of gross tons, 000 omitted

Iron ore production from Briey, Thionville-Metz and the Nancy basins proceeded along practically normal lines. That of France in general was rather less than in 1913, though with the added tonnage from the Metz-Thionville (re-annexed Lorraine) district the total about came up to the before the war quota for all of France.

A Good Record

Monthly average:	Pig iron	Steel
1913	427	385
1919	198	179
1920	272	242
Last year—1921:		
January	288	263
February	287	270
March	295	247
April	288	252
May	278	240
June	281	241
July	262	219
August	251	229
September	240	232

In thousands of gross tons, 000 omitted

French iron ore reserves now represent 35.2 per cent of the European total and French production 39.5 per cent of the total. Home consumption of French iron ore for the first six months of 1921 was 3,451,697 tons as against 144,524 tons imported, chiefly from Luxemburg. The late year prices for French ores all show reductions from those obtaining the first of the year. The 32 per cent Minette is now quoted 12 francs ($0.87) a ton for first quarter shipment.

Pig iron production in 1920 was 3,310,000 metric tons and the first eight months of 1921 reached 2,266,000 tons, which, at a proportionate progression would about equal that of the previous year. But due to blowing-out of furnaces August production fell off and the probable total for the year was not more than 3,250,000 metric tons. From 93 stacks in blast on Jan. 1, 1921, the number fell to 72 on July 1, and to 58 by August.

Hematite pig iron was steadily reduced in price from natural causes, and also by reason of the necessity of meeting English competition, which in the mid-year was some 70 odd francs a ton less than the comptoir price of 450 francs. Later, in October, French hematites fell officially to 400 francs ($29), but this price was shaded on export orders to Belgium. Synthetic hematite pig iron was offered by Pyrenean furnaces as low as 277 to 297 francs ($20.00 to $21.50) in November, according to composition.

Production of hematite pig iron steadily increased in volume though that of phosphorus pig iron increased from 79 per cent of the total production in 1919 to 85 per cent in 1920, practically remaining at that proportion for 1921. Basic-bessemer iron wavered around 63 per cent of the total production, with puddled iron at 9 per cent and foundry iron approximately 25 per cent. Import and export figures on these items showed entirely to the advantage of France as compared with the figures of the year before.

Steel ingot and casting production for the first six months of 1921 was in excess of that of 1920 by 332,933 tons, but the totals show a diminution of 16 per cent from those of the

second six months of 1920. The greatest part of the noted increase was naturally to the credit of Lorraine. The east of France and Alsace and Lorraine together produced 63.6 per cent of the entire country's production, as compared with 54.8 per cent in 1920, thus showing steady progress.

Monthly production figures of 324,000 metric tons in October 1920 fell steadily until finally they retreated to 268,000 tons in January 1921, to fall as low as 245,000 tons in June and 232,000 tons in August, making the eight months production of the present year 1,983,000 tons. September output went up to 236,000 tons. Basic-bessemer production last year was 57 per cent of the total and open-hearth basic figures worked out 39.8 per cent; for the both these were slight increases over 1920. Electric steel and iron which was notably active in 1920 fell off with the first of the new year, but took on a revival from September onward, with somewhat remarkable price fluctuations ranging from 225 francs to 275 francs the ton.

Steel plants operating in the mid-year, before the blast furnace crisis had made its effects fully felt, though for the most part these details refer to the big self-contained plants, were as follows: Acid-bessemer, 39 converters; basic bessemer 59 converters; open-hearth 94 furnaces; crucible 15 furnaces; and electric 14 furnaces. Steelworkers employed in France at this time numbered around 80,000.

Finished products for the first six months of 1920 and 1921 follow. It should be borne in mind that the second six months production of 1920 probably exceeded by far that of the second six months of 1921. The figures are:

	(Metric Tons)	
District	1920	1921
East	153,583	219,444
Alsace-Lorraine	347,355	380,024
Nord	112,186	111,206
Center	211,323	183,937
Southwest	41,314	36,346
Southeast	27,455	24,467
West	85,968	59,594

Few Plates and Sheets

Merchant bars lead in production in 1921, with plates and sheets in the second tonnage rank, followed by rails and shapes. Basic bessemer finished products increased in 1921, while open hearth fell off in tonnage. The weakest point of all French metallurgical operations in 1921 may be said to have been with respect to plates and sheets. In the first place there is shown practically no increase over figures of 1920. the 170,119 tons totalled for the first six months being practically the half of the year's production of 1920. Secondly the figures indicate a falling off in Lorraine, just where an increase should have been looked for, though the contiguous "Nord" department made a notable gain. Heavy plate production fell off throughout the country and imports thereof though feeble increased seven fold. Wire output increased as was to be expected, and tin plate held its own. Rails made a sufficient increase to be worthy of remark, about 80 per cent, while castings ran about even and steel forgings a little ahead of last year's figures. Total steel production increased in Alsace-Lorraine and the eastern district, was stationary in the north, fell off slightly in the center, the southwest and southeast, and notably so in the west.

To cite but three big steel plant developments of the year there may be mentioned the new Schneider plant at La Verriere, the Micheville, and Homècourt developments equipped by American makers and the formidable combination known as the Forges et Acieries du Nord et de l'Est, with a dozen grouped specialty plants variously situated throughout France. Also a combination achieved late in the year, the fusion of the Paul Girod electric iron and steel and the Electro-Metallurgique companies, may be mentioned.

Immigrants are Wanted

Throughout the French mining and metallurgical industries the labor and the wage question has been paramount. Five and 10 per cent reductions in the wage scale have been put into effect here and there. Cost of food which reached 426 per cent of prewar prices in September 1920 fell off to 329 per cent in September 1921, and the Paris cost-of-living index dropped from 370 in December 1920 to 307 in June 1921. In mid-November there were but 14,145 persons receiving out of work aid.

The Comite des Forges, on behalf of its constituent members, has organized a foreign labor service, in connection with the ministry of labor. Treaties providing for immigration have been ratified with Spain, Italy, Czecho-Slovakia and Poland. So acute is the unskilled labor situation that it is hoped to attract something like 250,000 Italians alone for work in the former invaded regions during the coming year, based on a further quasi-official agreement arrived at in mid-November. It is worth noting that French production of iron ore runs to but 300 tons per miner per annum, said to be 200 tons under the per capita output in the United States.

Labor in France was probably less emotionally mercurial during the year than in any other European country. There were partial local strikes in various metallurgical industries, but nothing of great moment happened

Labor unions in France have lost remarkably in membership of late. In 1913 there were 11,027,000 members; in 1919 these had fallen to 2,500,000, practically the same figure obtaining for 1920. These are the figures of the Bureau International du Travail. Belgium's membership on the other hand has grown from 200,000 to 920,000, and Italy's from 972,000 to 3,100,000.

Of 600,000 foreign laborers in France before the war, the estimated need today is for 1,000,000 as a minimum, of which 50,000 would be for the mines.

Obviously the transport situation must be improved in order that it may be the aid that it should to big industries. The Minister of Public Works has promised to evolve a scheme whereby preferential freight rates shall be granted to export iron and steel products. A general reorganization of the railway systems of France is due, which will give an impetus to equipment manufacturers.

Passenger traffic is practically on a prewar basis, and freight traffic wholly so in volume. There are 1000 more locomotives in use than before the war and 50,000 more freight cars. The eight hour law has brought about an increase of 100,000 employes in railway operation. Curiously the same eight hour law has demanded an increase of 17 per cent in the locomotives actually in daily service. Railway receipts for 10 months 1921 increased 355,000,000 francs.

Foreign Trade Gains Heavily

French imports of all kinds showed a big drop during the first 10 months of last year, 27,000,000 tons as against 40,000,000 tons in 1920. Exports during the same period increased by 1,750,506 tons. Import values fell off about 24,000,000 francs and export values exceeded those of imports by 480,000,000 francs. Exports up to August (taking into consideration and including the metallurgical products of Alsace-Lorraine) were 40,000,000 francs less than those of 1913, when a large part of the Lorraine figures were attributable to Germany.

In so far as French foreign trade in iron and steel is concerned the situation is distinctly encouraging. French exports of all iron and steel products gained strongly last year over 1920, and in view of the general stagnation in international trade this showing is remarkably good. Exports in 1921 were approximately 1,275,000 tons against 895,200 tons in 1920 and 578,000 tons in 1913. France is the only country in the world with a larger iron and steel export trade at present than before the war.

Germany Keeps On with Inflation

German Prices, Wages and Costs Go Up while Other Nations Reduce, but Declines in Exchange Keep Values Down—Production and Exports Increased—Mills Are Busy

By A High Official of The German Iron and Steel Industry

LAST year one country alone remained practically unaffected by the world crisis in iron and steel and that country was vanquished and crippled Germany. While in the victorious countries one blast furnace after another was blown out, the German iron and steel industry managed in 1921 to increase its production compared with the preceding year.

The causes of this strange phenomenon of an economic depression in the victorious countries and an apparently flourishing trade in defeated Germany are beginning to be recognized. They are found in short in the indemnity burdens and the consequent devaluation of the German mark, the latter partly representing production for which Germany is not being paid. Today the mark exchange reigns supreme on the German iron market. The ups and downs of foreign bills control the course of business, if they rise, orders keep coming in, but if the drop stagnation will undertake the German iron market as it has done that of the victorious nations.

When in the spring the mark was worth 1½ cents, conditions were little better in Germany than in the rest of the world. The number of unemployed rose, working hours were reduced, and few orders were placed from abroad. In May as a result of the acceptance of the ultimatum, the mark commenced to decline again; and with the first indemnity payments in August, the market began to revive. In other words, the reparations were paid indirectly with goods. This created activity, but not necessarily prosperity for Germany as a whole. The more precipitate the drop of the mark, the more insistent was the demand from home and abroad, until supply was unable to keep pace with it. The market situation was still further aggravated by the circumstance that the consumers who in spring had kept back orders, endeavored later to replenish their stocks in their panicky flight away from the rapidly declining mark.

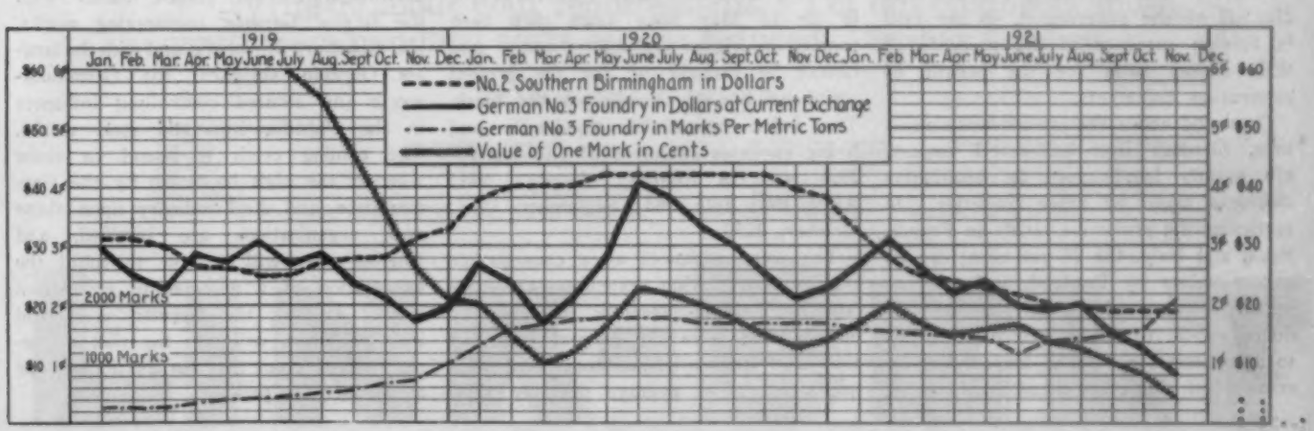
In this manner the German iron market adapted itself completely and closely to the exchange value of the mark during 1921, and it is fairly safe to assume that favorable conditions as to production will endure as long as the inflation of foreign bills continues. This circumstance, however, carries a grave danger with it. The growing inflation has raised wages, prices of raw material, freights and taxes to quite giddy heights and a permanent recession of the German exchange value would doubtless with one swoop stop all business in iron and steel and envelop the work in a calamitous crisis which might end a good deal worse than the world crisis. It stands to reason that the apparent and superficial boom enjoyed last year has little solid foundation.

How the Sanctions Worked

Other events occurred during the year which greatly impeded a normal development of production and sale. They were principally of a political nature. In April Germany's most important iron district was suddenly cut asunder by the establishment of a customs barrier right across it on the Rhine. The close and intimate traffic between the large industrial centers was heavily handicapped by a high tariff and special prescriptions regarding import and export from and to the occupied territory. Rerolling mills were severed from their smelting works, refining establishments were separated from their raw materials. The heaviest sufferers from these measures, the largest ironworks, such as the Phoenix, Krupps and Rheinstahl were forced temporarily to reduce operations and partly to draw their material from friendly concerns in order to avoid the customs tariff. And not before losses running into millions had been inflicted on the German iron and steel industry, was this measure abolished in September and normal business intercourse restored between the factories on both banks of the Rhine.

At about the same time the Saar industries which had been supplying the south of Germany with semifinished goods and pig iron were coerced into paying their wages in French francs. Since the Saar plants were previous to this compelled to pay for their coal in francs, they were obliged to retire almost completely from the German market.

In a similar predicament were the East German and Berlin finishing mills when the Polish insurrection broke out in Upper Silesia at the beginning of the year, and supplies of coal and iron ceased almost entirely. Several months elapsed before business returned to somewhat normal conditions; in fact just as conditions began to settle down the Geneva decision upset the economic equilibrium again by handling the largest part of the Upper Silesian iron and steel industry to Poland. The future of the Polish iron industry of Upper Silesia is as dark as it possibly can be. Nobody is able to predict whether the Poles will be able to keep the once


1919
1920
1921
Jan. Feb. Mar. Apr. May June July Aug. Sept Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
No. 2 Southern Birmingham in Dollars
German No. 3 Foundry in Dollars at Current Exchange
German No. 3 Foundry in Marks Per Metric Tons
Value of One Mark in Cents
2000 Marks
1000 Marks
$60
$50
$40
$30
$20
$10
5¢
4¢
3¢
2¢
1¢

flourishing works alive and continue to supply German consumers.

As the whole, the industry is still suffering seriously under the disabilities of the Spa coal agreement. The original quantity of 2,200,000 tons of coal per month has been reduced as neither France nor Belgium are in a position to absorb such huge quantities without grave injury to their own collieries. The amount of coal allotted to industry is not more than 50 to 60 per cent of its actual requirements. Efforts to increase production of coal have not been especially successful. In 1920 the average monthly production of coal was 10,950,000 metric tons. In 1921, this average dropped to 10,200,000, but the monthly production of coke increased from 2,100,000 tons in 1920 to 2,260,000 tons in 1921. With deliveries of coke to France and Belgium of 500,000 tons per month, there was not sufficient fuel left after taking care of foundry requirements to keep more than two-thirds of Germany's stacks in operation.

Prices Again Free

The home market for iron continued under state control during 1921, but important restrictions with regard to price regulation were removed. The maximum prices formerly laid down by the government on the basis of cost calculations for semifinished goods and rolled steel were abrogated at the end of April and price development left to be settled in a natural way by supply and demand. The table on page 90 gives a good idea of the year's price movements.

The export business also continued under state control. The minimum export prices were, it is true, dropped in April simultaneously with the maximum prices, but the quantities licensed for export remained under limitation.

Consequently upon the tremendous drop of the mark new export regulations were again put into force by the government in September. First a new export duty was levied which amounted to 5 to 6 per cent of the export value of rolling mill products. Besides this, the works were forced to place at the disposal of the government, 40 per cent in foreign currency of the proceeds of their export sales for the benefit of reparation payments.

Over and above the government's measures, German iron and steel exports are greatly handicapped by prohibitive measures taken by other countries. In particular the protective tariffs in France, Spain and Italy, the 26 per cent levy on export values by England, and the import restrictions of Switzerland have reduced export of German iron and steel to a considerable extent. Export has increased on the other hand to Holland, the Scandinavian countries, Austria and South America. Of new markets mention should be made of British India and the Dutch Indies, which have been supplied principally with bars and rolled steel, wire, pipes and railroad track supplies, as well as Japan, the eastern European border states, and Russia.

Works Fully Occupied

Statistics of exports during 1921 have been published only for the months of May to August. According to these, iron and steel products exclusive of machinery exported were as follow: May, 129,847 metric tons; June, 162,297, tons; July, 177,773 tons, and August, 240,035 tons. The figures for the succeeding months are likely to show a further increase, since the strongest demand commenced to set in with the beginning of autumn. Toward the end of the year German works were fully occupied for several months in advance and were unable to accept any new orders.

On comparison with conditions prevailing in England, America, and France, one would feel inclined to predict for Germany further favorable prospects for the future. But the primary conditions for such a development are moving in Germany in a diametrically opposite direction to those in the other countries. The costs of production are rising in Germany from day to day whereas the other iron producing countries are forcing them down systematically.

In Germany the price for blast furnace coke went up from 290 marks in January to 370 marks in September. A further rise by about 130 marks may be figured on soon. The increase in the coal tax to 40 per cent will naturally increase the prices of fuel. Railway freights were raised on April 1 by 65 per cent, on Nov. 15 by a further 30 per cent and on Dec. 1, by a still further 50 per cent. Freight rates on coal are now 17 times for bars 20 times, and for many special products 90 to 100 times the prewar charge.

Living Costs Go Higher

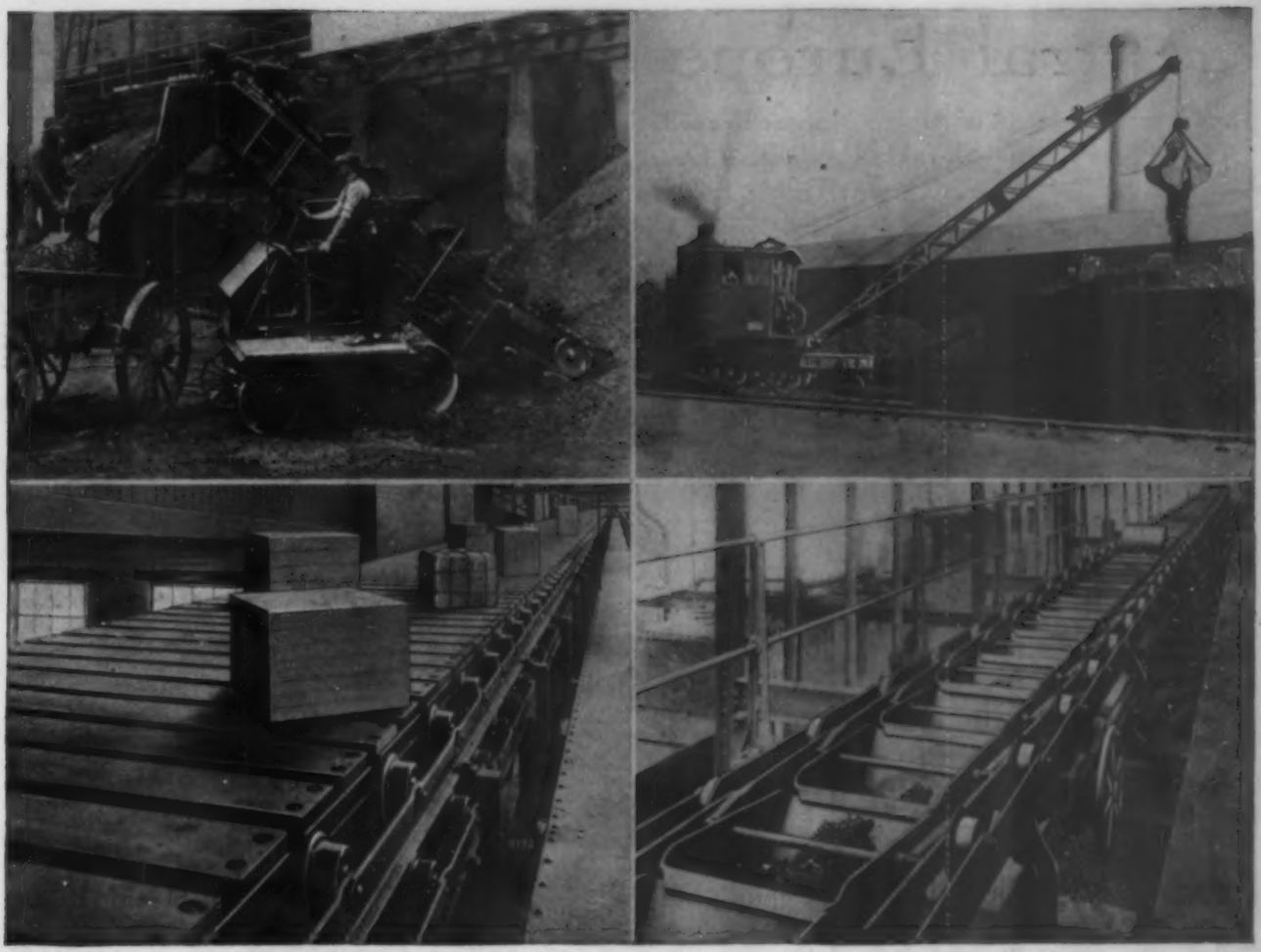
Living expenses which receded slightly up to May have since then been soaring up higher and higher and a stop cannot be thought of for the present owing to the devaluation of the mark. The index figures for foodstuffs and living expenses exclusive of clothing for 1921 were as follows: January, 944; April, 894; July, 963; September, 1062; October, 1250.

The wage advances as a consequence of increased living expenses are only just beginning. Recently increases by 50 per cent were the general rule, but they are frequently not considered adequate yet. The average pay per shift in the Ruhr district collieries was 60.72 marks during the first quarter of the year, 62.24 marks during the second quarter; 72.24 marks during the third quarter and 110 marks during the fourth quarter. The poor crop of potatoes, and the threatened food supply has already caused grave troubles and disturbances in various industrial areas, more strikes and serious labor troubles may be anticipated for the winter. At a price of 250 marks per dollar it is hardly possible for many industrial plants to purchase raw material any longer. And last but not least, new taxes of undreamed of magnitude are contributing their fair share to the inordinate enhancement of general expenses. All these factors have the natural tendency to rapidly diminish the gap between the costs in German industries and those of other countries, the bad mark value notwithstanding.

Selling Syndicates Disappear

As short a time ago as September, the Belgian wire industry was in a position to quote below the German wire makers. A reaction of prices to the world level is bound to ensue and preparations are already being made in authoritative quarters to cope with and alleviate a large increase of unemployment. The former solid supports during crises of this nature, namely the great selling syndicates, have disappeared, noticeable among them being the Stahlwerks Verband the Shipbuilding Steel association and the wire syndicate, all of which were dissolved during 1921. The new syndicates such as the Tube union and the Rail association are too weak to be of much use, especially since the general tendency for a combination into industrial syndicates is weaker than ever before.

In its place fusion and amalgamations in a vertical direction continue to proceed a pace after the example set by the Siemens-Rheinelbe-Schuckert Union. The A. E. G. has assimilated the Lauchhammer works in Saxony and the Linke Hoffmann Works in Silesia; the Gute Hoffnugshutte has joined hands with the largest German engineering works, the Augsburg-Nurnberg and with the largest German shipyard, the Germainiawerft and secured controlling influence in the Phoenix iron and steel works. The coming crisis is bound to show whether the high hopes set by the German iron and steel industry upon these new organizations are justified, and whether they will be able to fulfill the expectation of a decrease in production costs. If not, the German steel and iron producers will run the risk of being cut off from the world's market for a considerable period.



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Central Europe Getting Started

German Control of Alpine Montan Gesellschaft Provides Uninterrupted Coke Supply—Czecho-Slovakia Production Decreases in 1921—Hungarian Iron and Steel Output Treble 1920 Total—Russia Mines Less Ore

BY BRUNO SCHAPIRA
Central European Correspondent of The Iron Trade Review

MIXED conditions existed in Central Europe last year. In those countries where the currency was relatively undepreciated, the iron and steel industries were depressed. These countries included Czecho-Slovakia, Rumania and Jugoslavia, while countries with a bad rate of exchange, such as Austria, Hungary and Poland were able to produce cheaply and on the whole were saved from the crisis. This was because the latter were not really getting value in exchange for their tonnage, they were getting paper instead. The shortage of coal which made itself felt in 1920 was succeeded by a surplus in 1921. The turn of the German market in the autumn of last year put an end to the pressure from German producers thereby relieving the situation of the Czech market, while in Austria and in Hungary a high tide of business ensued.

In October and November the succession states met at Porterose, Italy, and concluded agreements of an important nature meant to put an end to the mutual seclusion of these countries. In this way a big, solid Central Eureopean economic bloc is to be created. At the end of 1921, all the iron and steel works of Central Europe are in a state of brisk activity which is likely to continue for some time to come. The prices are leaping upward due partly to the depreciation of the exchange and partly to the increasing demand.

Austrian Prices Rise

In Austria the shortage of coal was succeeded by abundant offers and production of iron and steel expanded. While in the adjoining states prices were gradually declining, in Austria they were rising incessantly owing to the increased costs of production caused by the deterioration of the exchange. Steel bars which in November 1920, cost 12,000 crowns per metric ton, amounted in February to 27,000 crowns. On Feb. 15, the railway tariffs were raised by more than 50 per cent.

In March a change took place which was of great importance for the Austrian iron and steel industry. The majority of the shares of the Alpine Montan-Gesellschaft passed from the hands of the Italian Fiat group into the possession of the German Stinnes group. Thus a continuous coke supply from Germany was secured to the Alpine, so that the company was enabled to blow in two more blast-furnaces. In April, the sale of iron was slackened to some extent, competition from abroad making itself felt more strongly. The delivery terms of the works became shorter. Nevertheless, the bar price of 27,000 crowns in February rose to 28,000 crowns in March and to 29,000 in April. Business then increased and the orders booked by the great steelworks was rather high even in May. A considerable part of their production was sold for export to Italy and overseas. The incessant decline of the Austrian crown led in September, to a further increase of the steel bar price to 31,000 crowns. German competition now ceased. In October, a further rapid fall of the Austrian crown ensued and within one month the price of bars rose to 50,000 crowns, then to 64,000 crowns per metric ton, finally climbing up to 96,000 crowns in November, without there being any prospect that this movement is coming to an end, for such is the decline of the crown that in American money, Austrian iron and steel is still the cheapest in the world. The works are now overcharged with orders and are naming delivery dates several months in advance. While the Austrian government is in an extremity, the Austrian iron and steel industry is taking a most favorable turn. Pig iron production in 1920 amounted to 100,000 tons; in 1921 it rose to 235,000 tons; the steel-production advanced from 125,000 tons in 1920 to 250,000 tons in 1921.

Some Typical Austrian and Czech Prices

Per Metric Ton in Czech and Austrian Crowns Respectively

Month	Czech foundry pig iron	Czech steel bars	Austrian steel bars	Value of Czech crown	Value of Austrian crown
Jan.	2950	4250	27,000	$0.0122	$0.0015
Feb.	2450	4000	28,000	0.0125	0.00142
Mar.	2450	4000	29,000	0.0132	0.00142
April	2450	4000	29,000	0.0135	0.00153
May	2450	4000	29,000	0.0145	0.0017
June	2250	3750	29,000	0.0142	0.0015
July	2250	3750	29,000	0.0133	0.0012
Aug.	2000	3150	30,000	0.012	0.0009
Sept.	2000	2750	37,000	0.0115	0.0006
Oct.	2000	2750	61,000	0.0104	0.0003
Nov.	2000	3100	96,000	0.011	0.0002

Czech Production Decreased

In Czecho-Slovakia production decreased in 1921, owing to the stagnancy in trade lasting almost the whole year until late in the autumn. During the first few months of 1921, the slowing up of sales in the Czech market continued without relief. In July, the Czech iron and steel industries were engaged at 25 per cent of capacity. In August, the Prager Eisen industrie was forced to blow out its last blast-furnace, to stop production at its iron-ore mines and restrict itself merely to producing steel out of foreign pig iron and scrap. Steel bars were reduced from 4000 crowns at the beginning of the year to 3150 crowns per ton, the latter being about $32.

In September the worst of the Czech stagnancy was overcome and the newly organized export selling syndicate began to get orders for finished material, the German works being unable to deliver promptly. The price of bars dropped to 2750 crowns per ton. In the fall the government removed all export restrictions. In October domestic business was still slack, but a series of export transactions on a large scale were entered into. In November, the Prager Eisen was able to blow in some of its blast furnaces, as the market showed a livelier turn. Bars advanced to 3110 crowns per metric ton. On Nov. 15 reduced railway freight rates were put in force. The business prospects of the Czech works which now unite almost their entire production in their selling syndicate, are judged to be more favorable at the present time, but before production can be increased very much heavy accumulated stocks must be sold. Czech pig iron production decreased from 650,000 tons in 1920 to 430,000 metric tons in 1921, while the steel production diminished from 1,000,000 tons in 1920 to 710,000 tons in 1921.

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"Why, I'll bet that you could run the flanged wheels of a locomotive over a ten-year-old KREODONE FLOOR and never make an impression. It has anything I ever saw beat for service, smoothness and quietness."

Furthermore, your floor will still be a "kid" when the rest of the factory is growing whiskers—that's how much life it has. Gets its stamina and ruggedness from high quality timber treated with pure unadulterated creosote oil.

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Plants: Indianapolis Minneapolis Mobile Seattle Norfolk

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152 Bay Street, Toronto, Canada
516 Beacon Bldg., Boston
Berkley Ward, Norfolk
222 Society for Savings Bldg., Cleveland
St. Louis Park, Minneapolis
317 Hammond Street, Cincinnati
August Court Co., Agents,
419 Chemical Building, St. Louis
Builders Specialty Co., Omaha
834 Real Estate Trust Bldg., Philadelphia
445 Central Bldg., Seattle
Masonic Temple, Mobile
211 Hamond Bldg., Detroit

Poland has a great future inasmuch as now the greater part of the prominent Upper Silesian coking coal fields are Polish together with three fifths of the iron and steel works in Upper Silesia. During the second quarter of the year, the Polish coke supply improved so that by June 1 the total annual output of 1920 was reached, which, however, amounted to only 100,000 tons against a prewar output of 420,000 tons of pig iron. In mid-year 1921, the Polish plants sold at fixed prices pig iron being 32,000 Polish marks and steel bars 42,000 to 45,000 marks, these prices being by far too low compared with world market prices. In August the price of pig iron rose to 50,000 and in November to 85,000 marks per ton. At the end of 1921, a slowing up was observed which can be traced back to the fact that the value of the Polish mark all of a sudden redoubled through the partition of Upper Silesia. The Polish pig iron production augmented to 250,000 tons in 1921 and the steel production from 60,000 tons in 1920 to 450,000 tons in 1921.

In Russia, which is in a state of utter exhaustion, iron and steel production is at its worst without there being any hope of recovery. The iron ore output which in 1913 amounted to 8,000,000 tons, reached only 200,000 tons for the whole of 1921, forming the basis for a production of barely 60,000 tons of pig iron against a prewar production of 4,484,000 tons including that of Poland. The Soviet government is taking every possible means to encourage the importation of iron and steel on a larger scale, but the means of payment are lacking.

Production Still Far Behind

Hungarian iron and steel production has reached treble that of last year, but it is still far behind the production of prewar times which amounted to 600,000 tons of pig iron and 800,000 tons of steel per year. The leading iron works of Rima Muranya is situated at the Czecho-Hungarian frontier. Its iron ore and coal beds have been assigned to Czechia so that the Hungarian production is dependent on the good grace of the Czechs. The political relations between these two states in 1920 and at the beginning of last year were in a rather critical state, so that the Czechs imposed obstacles to the export of iron ore and coal. But the lack of demand from Czech plants as well as the clearing up of the political atmosphere, facilitated the supply of raw materials, thus leading to production on an increased scale in Hungary. The depreciatoin of the exchanges of Central Europe brought about a high tide of the business in Hungary, as the demands of the engineering industry were very great, while the iron-trade effected purchases partly for speculation. At the end of 1921, the price of steel bars was 24,000 Hungarian crowns ($27) a ton with a tendency to rise. The pig iron production in 1921 amounted to 50,000 tons and the steel production to 60,000 tons.

Japanese Trade Is Regaining Strength

BY ICHIAUKE TAKANO
Japanese Correspondent, of The Iron Trade Review

THE Japanese iron and steel trade struggled through the entire year of 1921 for deliverance from the conditions of distress into which it had fallen after its spectacular rise during and subsequent to the war. Occasionally the trade showed indications of throwing off its depression, but the year has drawn to a close without substantial improvement. The industry hopes for a recovery in 1922.

From the spring of 1920 until the close of that year the majority of Japanese iron and steel mills, which numbered a little more than 140, were out of action, and at the beginning of 1921 only those which had strong financial support were operating. Therefore, production in Japan in 1921 was relatively small.

During the latter part of 1920 Japanese importers refrained from placing new orders with American mills and Japanese manufacturers believed that the domestic trade would improve. The only source of anxiety at the beginning of 1921 was the large tonnage carried over from 1920. The amount of pig iron was 423,000 tons and that of steel, 202,000 tons.

In February, 1921, when the market received news from the United States as to the United States Steel Corp.'s strong price maintenance policy, a favorable reaction set in. Buying improved greatly, and toward the close of the month the price tended markedly upward. In March, however, the Japanese government steelworks lowered its quotations and the trade became weaker. This fluctuation was not shared by pig iron, which remained lifeless and immobile all through the first quarter of the year, increasing the financial difficulty of the furnaces. In early summer the Japanese government announced its decision to levy new tariffs on metals, but pig iron was unaffected. The price was shaded more than ever by furnaces, while merchants dumped their supplies on the market. Merchants hoped that the new tariff might have a favorble effect on steel, but even this gave no response. The summer of 1921 was the worst period in the trade since the cessation of the world war.

Improvement Was Expected

Toward the close of the summer season the general opinion was that some degree of improvement might be witnessed in the fall. But at the same time European steel producers started dumping their material in Japan. In the pig iron market Manchurian furnaces tried to dispose of their cargo at lower prices. Chinese pig iron also invaded the market frequently. The Oriental Steel Works was unable to stand the financial strain and was placed under official control. In the middle of September the Penchifu Iron & Coal Co. blew out its furnaces.

Toward the close of September the visible stock of pig iron in Japan was reduced to 274,000 tons, while the stock of steel was only slightly above 150,000 tons. The supply of some steel shapes was found to be abnormally short. The comparatively prosperous condition of the cotton spinning industry gave a powerful stimulus to producers of cotton mill equipment. Hardware makers also received new orders from provincial districts, where the high price of grain exercised a good influence on retail business. The manufacturers started new buying on a small scale in the pig iron market. In the steel market provincial builders began to buy sheets and bars, and despite the shipbuilders' suspension the movement of cargo was good.

In the pig iron market buying has since been maintained fairly well, and notwithstanding the naval holiday proposal the market is not relapsing into its former weak condition. Though sales are small, production is smaller and the market is in a position to maintain its stability and price with greater ease than before. It may be a considerable time before furnaces are enabled to resume normal operations.

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Japan's Iron and Steel Trade Figures for 1921

IMPORTS OF PIG IRON AND SEMI-FINISHED STEEL
(First 8 months)

	Volume piculs	Metric tons
From:		
China	793,498	53,429
Manchuria	851,828	57,356
British India	545,815	36,751
Sweden	292,877	19,785
United States	35,550	2,393
Other countries	926	68
Total	2,889,271	194,546

IMPORTS OF SHAPES
(First 8 months)

China	19,066	1,398
Great Britain	1,155,790	84,758
Sweden	27,003	1,980
United States	4,572,707	335,330
Other countries	495,057	36,304
Total	6,269,623	459,770

IMPORTS OF TUBES AND PIPES
(First 8 months)

Great Britain	41,868	3,070
United States	460,318	33,756
Other countries	7,372	541
Total	509,558	37,367

NAILS

United States	124,784	9,150
Other countries	78,135	5,729
Total	202,919	14,879

EXPORTS
(First 8 months)

	Volume in piculs	Metric tons
Ingots and slabs	34,100	2,500
Bars, rods, sheets and plates	193,852	14,216
Wire	9,241	677
Wire ropes	11,684	856
Pipes and tubes	41,978	3,077
Scrap	81,738	5,993
Others	4,393	322

PIG IRON QUOTATIONS IN 1921
(Per Metric Ton, Tokio, at End of Month)

	No. 1 Wanishi (Japanese)		No. 3 Cleveland	
January	78.00	37.44	95.00	40.80
February	75.00	36.00	85.00	40.80
March	78.00	37.44	78.00	37.44
April	77.00	36.96	77.00	36.96
May	70.00	33.60	70.00	33.60
June	65.00	31.20	70.00	33.60
July	63.00	30.25	70.00	33.60
August	63.00	30.25	71.00	34.08
September	63.00	30.25	77.00	36.96
October	66.00	31.68	80.00	38.40
November	66.00	31.68	85.00	40.80

STEEL QUOTATIONS
(Per Metric Ton, Tokio, at End of Month)

	Round bars		Sheets		Plates	
	Yen	$	Yen	$	Yen	$
Jan.	4.80	60.60	8.00	100.99	5.00	63.12
Feb.	6.20	78.27	9.00	113.62	5.00	63.12
Mar.	5.50	69.43	9.00	113.62	5.30	66.91
April	5.40	68.17	7.50	94.68	5.80	73.22
May	5.20	65.64	7.70	97.21	4.50	56.81
June	5.00	63.12	7.00	88.37	4.30	54.28
July	4.80	60.60	6.80	85.84	4.00	50.50
Aug.	4.70	59.33	6.70	84.58	4.10	51.77
Sept.	5.00	63.12	7.50	94.68	4.50	56.81
Oct.	5.10	64.38	7.70	97.21	4.50	56.81
Nov.	4.90	61.86	7.50	94.68	4.50	56.81

PRODUCTION IN 1921

Pig iron, first half	319,000
Pig iron, second half estimated	270,000
Total, metric tons	589,000
Steel, first half	270,194
Steel, second half, estimated	292,000
Total, metric tons	562,194

The late fall buying in the steel market was coming to a close in the middle of October, and in view of diminishing production of sheets, tin plate, nails and some other goods, Japanese importers placed orders with America or accepted low-priced offers from European producers. The visible stocks once more commenced to increase. While labor troubles ceased at shipyards in Kobe and Osaka, they started in Tokio and Yokohama, and the sale of ship plates was stopped entirely. In the middle of November the steel trade had another factor to contend with in the proposed naval holiday. This was not seriously considered by the market, because the Japanese navy bought its requirements from the government steelworks of Yawata, and the general market felt little interest in the naval construction program. But consumers were more inclined to desist from buying in anticipation of lower prices.

Stocks Fairly Large

On Oct. 2 the visible stock of pig iron was 268,121 tons, while the visible stocks of steel at the end of October were as follows: Bars, 45,610 tons; sheets and plates, 37,925 tons; tin plate, 2445 tons; nails, 2062 tons, the total including some other material being 113,952 tons.

As regards the production in 1921, only estimates are available. The following is the official estimate of production up to June 30: Pig iron, 319,000 tons, and steel, 270,194 tons. The estimated production of pig iron in the last half of 1922 is 270,000 tons and that of steel, 292,000 tons. Additional statistics including production, imports, exports, and prices are given in the accompanying table.

Spain and Italy Are Facing Deflation

FOR somewhat different causes, the iron and steel industries of the two Mediterranean countries, Spain and Italy, followed parallel courses in 1921. In both countries the deflation in values and production was most drastic. Spain had some special difficulties to deal with in connection with the iron ore situation. The mining of iron ore lies at the base of Spanish iron and steel prosperity, and in this field Spain is particularly dependent on British conditions.

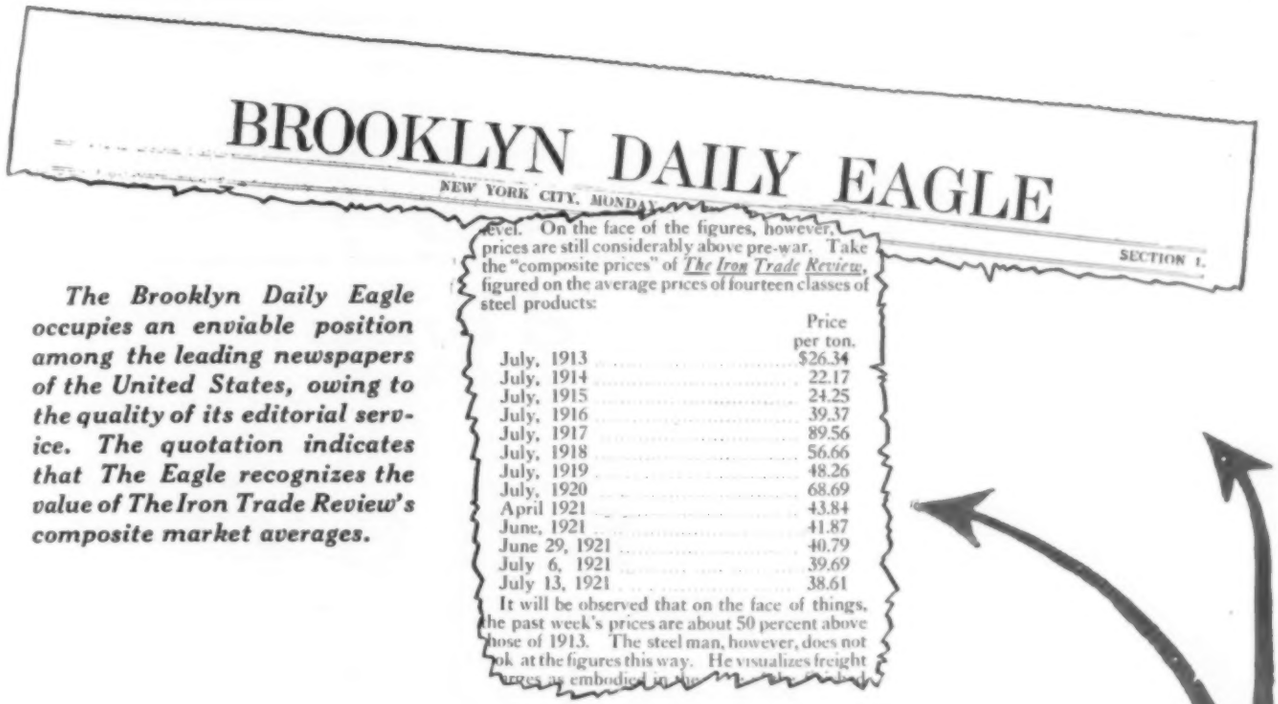
The coal strike with its consequent collapse of pig iron production in the United Kingdom had a dramatic effect on Spanish iron mining activities. In 1920 British imports of Spanish ore were 4,114,000 gross tons, this being considerably in excess of 1919 and within range of the prewar average. The monthly average of shipments in 1920 was 344,900 gross tons. In the first quarter of 1921 this average dropped to 159,500 tons, and in the second quarter under the influence of the British miners' strike to only 12,100 tons per month. This is by far the lowest record since England began to use Spanish ore in bulk. Since the second quarter there has been a recovery to 34,900 tons in September, but this rate is only 10 per cent of last year's average. Spanish mines, therefore have been closed down to a greater extent than ever before in their history.

Better conditions are expected during the ensuing year. British ore requirements are increasing; the large stocks accumulated in England last spring have been worked off; and Germany for the first time in seven years is again an appreciable factor in the market.

More Business Expected

The production of pig iron in Spain is now about 50 per cent of capacity, with steel output in a similar condition. It is believed this year will see something of a recrudescence of iron and steel manufacture, due partially to the deflation in ore prices and other working costs, and also because the high tariff now in effect has a tendency to exclude foreign iron and steel products.

In Italy too the tide of deflation in production and prices seems to have reached its lowest ebb. Output has been more drastically curtailed in the old Roman kingdom than elsewhere in Europe. Pig iron production, which was 463,000 tons in 1917 dropped to 239,000 tons in 1919 and to 88,063 tons in 1920, with a further fall to an estimated output of 50,000 tons last year. This is about 11 per cent of capacity. That Italy's curtailment has not been due so much to general world conditions as to the internal situation would seem to be indicated by the fact that by far the biggest slump in production occurred in 1920 when buying was active. The Italian production of steel makes a better showing than that of pig iron, but it too has fallen off heavily. To assist in the recovery of the iron and steel industry, the Italian government is levying high duties on ferrous products, but since Italy is not self-contained as to fuel, imports of finished materials remain heavy. A plan to use some of Lorraine's surplus pig iron and semi-finished steel in Italian steelworks and rolling mills is now being elaborated.



BROOKLYN DAILY EAGLE

NEW YORK CITY, MONDAY SECTION 1.

level. On the face of the figures, however, prices are still considerably above pre-war. Take the "composite prices" of *The Iron Trade Review*, figured on the average prices of fourteen classes of steel products:

	Price per ton.
July, 1913	$26.34
July, 1914	22.17
July, 1915	24.25
July, 1916	39.37
July, 1917	89.56
July, 1918	56.66
July, 1919	48.26
July, 1920	68.69
April 1921	43.84
June, 1921	41.87
June 29, 1921	40.79
July 6, 1921	39.69
July 13, 1921	38.61

It will be observed that on the face of things, the past week's prices are about 50 percent above those of 1913. The steel man, however, does not look at the figures this way. He visualizes freight [illegible] as embodied in this [illegible]

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Composite Market Average

Representing the Combined Average Prices per Ton of Fourteen Leading Iron and Steel Products, Yesterday, One Week, One Month, Three Months, One Year and Nine Years Ago

January 4, 1922	December 28, 1921	December, 1921	October, 1921	January, 1921	January, 1913
$33.64	$33.73	$33.99	$35.46	$51.98	$27.96

Products Included Are Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

Iron and Steel Prices

Pig Iron

Bessemer, valley	$19.75
Bessemer, Pittsburgh	21.71
Basic, valley	18.25 to 18.50
Basic, Pittsburgh	20.21 to 20.46
Basic, Buffalo	19.00 to 20.00
Basic, delivered, eastern Pa.	20.25
Malleable, valley	19.50 to 20.00
Malleable, Pittsburgh	21.46 to 21.96
Malleable, Chicago	19.00 to 19.50
Malleable, Buffalo, furnace	19.00
Malleable, del., eastern Pa.	22.50 to 25.50

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern foundry	1.75 to 2.25
No. 2X East'n and Virginia	2.25 to 2.75
No. 1X Eastern	2.75 and up
No. 1 Chicago	2.25 to 2.75
No. 2 foundry Eastern	1.75 to 2.25

No. 1X, eastern del., Phila.	23.80 to 25.00
No. 1X, Buffalo	20.50 to 21.00
No. 2 foundry, valley	19.50 to 20.00
No. 2 foundry, Pittsburgh	21.46 to 21.96
No. 2 foundry, Buffalo	19.50 to 20.00
No. 2 foundry, Chicago	19.00 to 19.50
No. 2 foundry, Ironton furnace	20.00
No. 2 foundry, Cleveland	**20.50 to 21.00**
No. 2 foundry del. Philadelphia	20.50 to 21.25
No. 2 foundry, N. J., tidewater	21.20 to 21.95
No. 2X, eastern del. Phila.	21.00 to 21.75
No. 2X, eastern N. J., tidewater	21.75 to 22.45
No. 2X, eastern del. Boston	23.56 to 25.06
No. 2X, foundry, Buffalo fur.	20.00 to 20.50
No. 2X, Buffalo del. Boston	24.96 to 25.96
No. 2 southern, Birmingham	16.50 to 17.00
No. 2 southern, Cincinnati	21.00 to 21.50
No. 2. southern, Chicago	23.16 to 23.66
No. 2 southern, Philadelphia	25.16 to 25.66
No. 2 southern, Cleveland	23.16 to 23.56
No. 2 southern, Boston	24.16 to 24.66
No. 2 southern, St. Louis	22.22 to 22.72
No. 2X, Virginia furnace	22.00 to 22.50
No. 2X, Virginia Phila.	27.74 to 28.24
No. 2X, Virginia Jersey City	28.16 to 28.66
No. 2X, Virginia Boston	28.58 to 29.08
Gray forge, eastern Pa.	21.00 to 22.00
Gray forge, val. del. Pitts.	21.46
Low phos., standard valley	33.50 to 34.00
Low Phos., standard, Phila.	35.32
Low phos., Lebanon furnace	28.70
Charcoal, Birmingham	35.00
Charcoal, Superior, Chicago	31.50
Silvery Iron 8 per cent base	
Jackson county, O., furnace	29.50
Tennessee, Chicago delivery	Nominal
Ohio brands, Chicago	34.82
Bessemer Ferrosilicon Jackson County, Ohio, furnace	
10 per cent	$38.50
11 per cent	41.80
12 per cent	45.10
13 per cent	49.10
14 per cent	54.10

Ferro-Alloys

Ferromanganese, 80 per cent, Pittsburgh, domestic metal	$60.00 to 63.67
Ferromanganese, 80 per cent, English, c.i.f. Atlantic port	58.35
Spiegel, 18 to 22 per cent furnace spot	25.00 to 26.00
Ferrosilicon, 50 per cent, contract delivered	5500 to 60.00
Ferrotungsten, standard, per pound contained	35.00 to 40.00
Ferrochrome, 60 to 70 chromium, 6 to 8 carbon, per pound contained, makers plant	14.00c to 15.00c
Imported ferrochrome, 6 to 8 per cent carbon	10.00c to 12.00c
Ferrovanadium, 30 to 40 per cent per pound estimated, according to analysis	$4.00 to $5.00
Ferro carbon-titanium, carloads, producers plant, per net ton	$200.00

Coke

Beehive, Ovens

Connellsville furnace	$2.75 to 3.00
Connellsville foundry	3.50 to 4.00
Pocahontas furnace	5.50 to 6.50
Pocahontas foundry	6.50 to 7.50
New River furnace	6.50 to 7.50
New River foundry	8.00 to 8.50
Wise county furnace	4.50 to 4.75
Wise county foundry	5.50 to 5.75
Alabama furnace	4.50 to 5.00
Alabama foundry	5.25 to 5.75
Alabama pitch coke	8.00 to 8.50
By-Product	
Foundry, Newark, N. J., delivered	$8.84
Foundry, Chicago, ovens	11.25
Foundry, Boston, delivered	10.66
Foundry, Granite City, Ill., ovens	9.50

Semifinished Material

BILLETS AND BLOOMS (4 x 4-inch)

Open-hearth, Pittsburgh	$28.00 to 30.00
Open-hearth, Youngstown	28.00 to 30.00
Open-hearth, Philadelphia	34.74
Bessemer, Pittsburgh	28.00 to 30.00
Bessemer, Youngstown	28.00 to 30.00
Forging, Philadelphia	39.74
Forging, Pittsburgh	32.00 to 35.00
SHEET BARS	
Open-hearth, Pittsburgh	$28.50 to 30.00
Openhearth, Youngstown	29.00 to 30.00
Bessemer, Pittsburgh	28.50 to 30.00
Bessemer, Youngstown	29.00 to 30.00
SLABS	
Pittsburgh and Youngstown	$29.00
WIRE RODS AND SKELP	
Wire rods, Pittsburgh	$38.00
Grooved skelp, Pittsburgh	1.50c to 1.60c
Universal skelp, Pittsburgh	1.50c to 1.60c
Sheared skelp, Pittsburgh	1.50c to 1.60c

Shapes, Plates and Bars

Structural shapes, Pittsburgh	1.50c to 1.65c
Structural shapes, Philadelphia	1.80c to 1.85c
Structural shapes, New York	1.83c to 1.88c
Structural shapes, Chicago	1.65c to 1.75c
Tank plates, Pittsburgh	1.50c to 1.65c
Tank plates, Philadelphia	1.80c to 1.85c
Tank plates, New York	1.83c to 1.88c
Tank plates, Chicago	1.60c to 1.75c
Bars, soft steel, Pittsburgh	1.50c to 1.60c
Bars, soft steel, Philadelphia	1.80c to 1.85c
Bars, soft steel New York	1.83c to 1.88c
Bars, soft steel, Chicago	1.60c to 1.75c
Bars, hard steel, Chicago	1.65c
Reinforcing bars, Pittsburgh	1.45c to 1.60c
Bar iron, common, del. Pitts.	2.03c to 2.20c
Bar iron, common, Philadelphia	1.85c
Bar iron, common, New York	1.88c
Bar iron, common, Chicago	1.65c

Hoops, Bands, Shafting

Hoops, Pittsburgh	2.00c to 2.25c
Bands, Pittsburgh	1.75c to 2.25c
Cold finished steel bars, Pittsburgh base	2.00c to 2.15c

Rails, Track Material

Standard bessemer rails, mill	$40.00
Standard open-hearth rails, mill	40.00
Relaying rails, St. Louis	25.00 to 35.00
Relaying rails, Pittsburgh	26.00 to 30.00
Light rails, 25 to 45, mill	1.55c to 1.65c
Angle bars, Chicago base	2.45c
Spikes, railroad, Pittsburgh	2.25c to 2.50c
Spikes, railroad, Chicago	2.58c to 2.68c
Track bolts, Pittsburgh	3.25c to 3.75c
Track bolts, Chicago	3.58c to 3.68c
Tie plates, Pittsburgh	2.00c to 2.25c
Tie plates, Chicago	1.90c to 2.25c

Wire Products

100 lbs. to Jobbers in Carloads

Wire nails, Pittsburgh	2.50c
Plain wire, Pittsburgh	2.25c
Galvanized wire, Pittsburgh	2.75c
Barbed wire, painted, Pitts.	2.65c
Barbed wire, galv., Pittsburgh	3.15c
Polished staples, Pittsburgh	2.65c
Galvanized staples, Pittsburgh	3.15c
Coated nails, per count keg, Pitts.	2.10c

Chain, Piling, Strip Steel

Chain, 1 in. proof coil, Pitts.	5.90c
Sheet piling base, Pittsburgh	1.55c to 1.80c
Hot rolled strip steel, Pittsburgh stamping quality	2.00c to 2.25c
Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100-inch and heavier, base	3.75c

Sheets

SHEET MILL BLACK

No. 28, open-hearth, Pittsburgh	3.00c
No. 28, bessemer, Pittsburgh	3.00c
No. 28, open-hearth, Phila.	3.35c
No. 28, open-hearth, Chicago	3.38c
TIN MILL BLACK	
No. 28, open-hearth, Pittsburgh	3.00c
No. 28, open-hearth, Chicago	3.13c to 3.38c
GALVANIZED	
No. 28, open-hearth, Pittsburgh	4.00c
No. 28, bessemer, Pittsburgh	4.00c
No. 28, open-hearth, Phila.	4.35c
No. 28, open-hearth, Chicago	4.38c
BLUE ANNEALED	
No. 10, open-hearth, Pittsburgh	2.25c
No. 10, bessemer, Pittsburgh	2.25c
No. 10, open-hearth, Phila.	2.60c
No. 10, open-hearth, Chicago	2.60c to 2.85c

Tin Plate

Per 100 lb. box.

Tin plate, coke base, Pitts.	$4.75

Iron and Steel Pipe

Base Discounts Pittsburgh to Jobbers in Carloads

	Black	Galv.
1 to 3-inch, butt steel	71	58½
1 to 1½-inch, butt iron	44½	29¼

Boiler Tubes

Carload Discount 4 Points Larger

Steel, 3½ to 13 inches, l. c. l.	53 off
Charcoal iron, 3½ to 4½ inches, l. c. l.	28 off

Cast Iron Water Pipe

Without War Freight Tax

Class B Pipe

Four-inch, Chicago	$46.60 to 48.10
Six-inch and over, Chicago	42.60 to 44.10
Four-inch, New York	50.30
Six-inch and over, New York	47.30 to 48.30
Four-inch, Birmingham	38.00
Six-inch and over, Birmingham	35.00
Three-inch, Birmingham	45.00
Four-inch, New York	50.30

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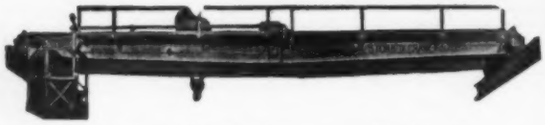

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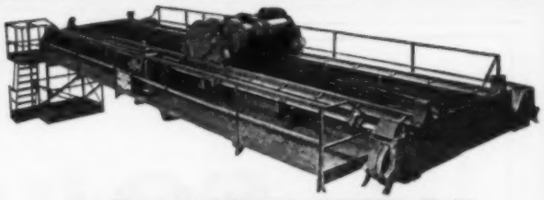

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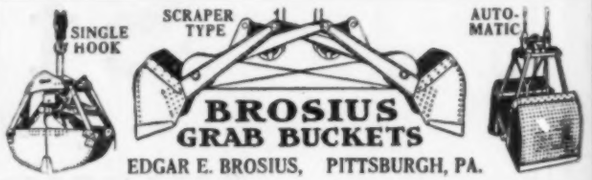

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